

PROJECT MANUAL AND SPECIFICATIONS

VOLUME I

For

Rappahannock Community College Renovation

Project Code: 260-17712

Glenns and Warsaw, Virginia
Permit Documents
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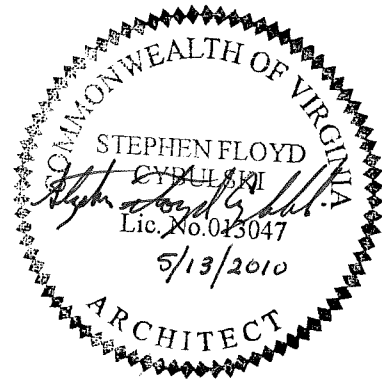
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COMMONWEALTH OF VIRGINIA



GENERAL CONDITIONS OF THE CONSTRUCTION MANAGER "AT RISK" CONSTRUCTION CONTRACT

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PLEASE NOTE: These CO-7CM, General Conditions of the Construction Manager "At Risk" Construction Contract, have been created specifically for the use of agencies of the Commonwealth of Virginia, which may not alter their provisions without the express written approval of the Virginia Department of General Services, Division of Engineering and Buildings. These General Conditions have significant legal implications and shall not be altered or modified or amended or deleted or its intent changed, except by an approved and properly issued Supplemental General Condition. The Commonwealth makes no representation as to their suitability for any other purpose. (Note: Political subdivisions intending to modify the General Conditions for their use should consult with their legal counsel.)

1. DEFINITIONS

Whenever used in these General Conditions of the Construction Contract ("General Conditions") or in the Contract Documents, the following terms have the meanings indicated, which are applicable to both the singular and plural and the male and female gender thereof:

Agency: The Agency, institution or department which is a party to the Contract. For purposes of the Contract, the term Owner shall include such Agency, whether or not the Agency owns the site or the building.

Architect, Engineer, Architect/Engineer or A/E: The term used to designate the Architect and/or the Engineer that contracts with the Owner to provide the Architectural and Engineering services for the Project. The A/E is a separate contractor and not an agent of the Owner. The term includes any associates or consultants employed by the A/E to assist in providing the A/E services.

Beneficial Occupancy: The condition after Substantial Completion but prior to Final Completion of the Project at which time the Project, or portion thereof, is sufficiently complete and systems operational such that the Owner could, after obtaining necessary approvals and certificates, occupy and utilize the space for its intended use. Guarantees and warranties applicable to that portion of the Work begin on the date the Owner accepts the Project, or a portion thereof, for such Beneficial Occupancy, unless otherwise specified in the Supplemental General Conditions or by separate agreement.

Change Order: A document (Form CO-11) issued on or after the effective date of the Contract between Owner and Contractor (Form CO-9) which is agreed to by the Contractor and approved by the Owner, and which authorizes an addition, deletion or revision in the Work, including any adjustment in the Contract Price and/or the Contract Completion Date. The term Change Order shall also include written orders to proceed issued pursuant to Section 38 (a) (3). A Change Order, once signed by all parties, is incorporated into and becomes a part of the Contract.

Code of Virginia: 1950 Code of Virginia as amended. Sections of the Code referred to herein are noted by § xx-xx.

Construction: The term used to include new construction, reconstruction, renovation, restoration, major repair, demolition and all similar work upon buildings and ancillary facilities, including any draining, dredging, excavation, grading or similar work upon real property.

CM Contingency: The Construction Management Contingency is generally defined as that component of the Guaranteed Maximum Price set aside to address the cost of the work or other components of the GMP that were reasonably unforeseen at the time the GMP was developed. Potential costs include, but are not necessarily limited to: refinements to the project documents as a result of the continuing development of the design, scope gaps between trade contractors, contract default by subcontractors, costs of corrective work not provided for elsewhere, constructability issues and issues related to field conditions which a prudent CM should have reasonably detected during discharge of any preconstruction duties provided by this CM. The CM Contingency is not intended to address the cost of project scope changes made after the GMP was developed.

The CM Contingency may be applied to any work or other component of the GMP without the necessity of a Change Order. Use of a portion of the CM Contingency does not change the contract amount which is based on the GMP, but does increase the amount of money to be paid the CM for the Work while simultaneously and equally decreasing the amount of money remaining in the CM Contingency.

Use of the CM contingency may only be made with the written approval of the Owner. The Owner shall specify the procedure for the CM to request the use of any portion of the CM Contingency. As a minimum, the Owner shall require the CM to specify: the amount of the CM Contingency requested the intended reason for the requirement, and the justification for the use of the CM Contingency. Unless otherwise

specified in the Contract between the Owner and Contractor, all CM Contingency remaining at project conclusion shall be shared equally between the owner and contractor.

The Owner may, through Supplemental General Conditions, define subcategories of the CM Contingency and prescribe the uses of funding within the subcategories.

Construction Manager or Construction Manager "At Risk" (CM): The person, firm or other legal entity with whom the Owner has entered into a contractual agreement to provide all construction work and services for the project for a Guaranteed Maximum Price (GMP) and to be 'At Risk' for the providing the Work within the GMP amount stated in the contract. The CM is hereinafter called the Contractor in these General Conditions.

Contract: The Contract between Owner and Contractor, Form CO-9CM, hereinafter referred to as the Contract.

Contract Completion Date: The date by which the Work must be substantially complete. The Contract Completion Date is customarily established in the Notice to Proceed, based on the Time for Completion. In some instances, however, the Contract contains a mandatory Contract Completion Date, which shall be stated in the Invitation for Bid.

Contract Documents: The Contract between Owner and Contractor (Form CO-9CM) signed by the Owner and the Contractor and any documents expressly incorporated therein. Such incorporated documents customarily include the bid submitted by the Contractor, these General Conditions, any Supplemental General Conditions, any Special Conditions, the plans and the specifications, and all modifications, including addenda and subsequent Change Orders.

Contract Price: The total compensation payable to the Contractor for performing the Work, subject to modification by Change Order. Also known as the GMP or the guaranteed maximum price, as defined below.

Contractor: The person with whom the Owner has entered into a contractual agreement to do the Work on this project. In this contract, the Contractor shall also mean the CM or the Construction Manager "At Risk"

Cost of the Construction Work: Cost of the Construction Work is generally defined as the direct costs of labor, materials, equipment, and associated costs of the trades / subcontracts which are incorporated into the completion of a project.

Construction Manager's Fee: Construction Manager's Fee or CM Fee or Contractor's Fee is generally defined as the sum included for home office expenses, overhead, profit, and general management of the Contract during the construction phase of the Contract, subject to modification by Change Order.

Day(s): Calendar day(s) unless otherwise noted.

Defective: An adjective which, when modifying the word Work, refers to Work that is unsatisfactory, faulty, deficient, does not conform to the Contract Documents or does not meet the requirements of inspections, standards, tests or approvals required by the Contract Documents, or Work that has been damaged prior to the A/E's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion or Beneficial Occupancy).

Drawing: A page or sheet of the Plans which presents a graphic representation, usually drawn to scale, showing the technical information, design, location, and dimensions of various elements of the Work. The graphic representations include, but are not limited to, plan views, elevations, transverse and longitudinal sections, large and small scale sections and details, isometrics, diagrams, schedules, tables and/or pictures.

Emergency: Any unforeseen situation, combination of circumstances, or a resulting state that poses imminent danger to health, life or property.

Final Completion Date: The date of the Owner's acceptance of the Work from the Contractor upon confirmation from the Architect/Engineer and the Contractor that the Work is totally complete in accordance with Section 44(b).

Field Order: A written order issued by the A/E which clarifies or explains the plans or specifications, or any portion or detail thereof, without changing the design, the Contract Price, the Time for Completion or the Contract Completion Date.

Float: The excess time included in a construction schedule to accommodate such items as inclement weather and associated delays, equipment failures, and other such unscheduled events. It is the contingency time associated with a path or chain of activities and represents the amount of time by which the early finish date of an activity may be delayed without impacting the critical path and delaying the overall completion of the Project. Any difference in time between the Contractor's approved early completion date and the Contract Completion Date shall be considered a part of the Project float.

Float, Free: The time (in days) by which an activity may be delayed or lengthened without impacting upon the start day of any activity following in the chain.

Float, Total: The difference (in days) between the maximum time available within which to perform an activity and the duration of an activity. It represents the time by which an activity may be delayed or lengthened without impacting the Time for Completion or the Contract Completion Date.

General Conditions Fee:

(a) The "General Conditions Fee" is generally defined as the total compensation amount payable Price (GMP) and is subject to modification by Change Order.

(b) The CM General Conditions includes those items of cost and or work as follows and the cost of these items / work are included in the Construction Manager's General Conditions Fee. The General Conditions Fee is to be considered as a fixed amount and shall be inclusive of the Project Scope of Work as defined by the Contract. The General Conditions Fee is to be inclusive of both project site and home office costs required to execute the requirements for the Project. The Construction Manager's General Conditions Fee Proposal attached to the Contract shall include unit rates for all possible line items that would be used as a basis for an increase in the Fixed General Conditions amount should a major change in the Project Scope of Work take place. The Proposal must include a delineation of each GM/CM team member's staffing costs. Such staffing costs must be represented as hourly rates reflecting direct salaries plus burdens minus any mark-up for overhead and profit. Also to be included are the durations of assignments anticipated for each member of the GM/CM team.

Guaranteed Maximum Price (GMP): The Guaranteed Maximum Price (GMP) is generally defined as the sum total of the "Cost of the Construction Work", the CM Contingency, the "General Conditions Fee", and the "CM (or Contractor's) Fee" which the Construction Manager agrees is the total compensation payable to the CM/Contractor for performing the Work in the Contract. Such Work includes the entire completed construction, or the various separately identifiable parts thereof, required to be provided under the Contract Documents or which may be reasonably expected to be provided as part of a complete, code compliant and functioning system for those systems depicted in the plans and specifications. The GMP is only subject to modification by Change Order for work directed by the Owner which was not in the scope of work or not reasonably expected to be included in the Work, as described by the systems, plans and specifications provided to the Construction Manager for determining the GMP.

Notice: All written notices, including demands, instructions, claims, approvals and disapprovals, required or authorized under the Contract Documents. Any written notice by either party to the Contract shall be sufficiently given by any one or combination of the following, whichever shall first occur: (1) delivered by hand to the last known business address of the person to whom the notice is due; (2) delivered by hand to the person's authorized agent, representative or officer wherever they may be found; or (3) enclosed in a postage prepaid envelope addressed to such last known business address and delivered to a United States Postal Service official or mailbox. Notice is effective upon such delivery. All notices to the Owner should be directed to the Project Manager.

If the Owner and the Contractor agree in writing that Notices transmitted by Facsimile (Fax) are acceptable for the Project, such Notice shall be transmitted to the Fax number listed in the agreement and shall have a designated space for the Fax Notice recipient to acknowledge his receipt by authorized signature and date. The Fax Notice with authorized signature acknowledging receipt shall be Faxed back to the sender. The Faxed Notice shall be effective on the date it is acknowledged by authorized signature. All Faxed Notices shall also be sent by hard copy, which shall be effective upon delivery, as provided herein. Notice shall be effective upon the date of acknowledgment of the Faxed Notice or the date of delivery, whichever occurs first.

Notice to Proceed: A written notice given by the Owner to the Contractor (with a copy to A/E) fixing the date on which the Contract time will commence for the Contractor to begin the prosecution of the Work in accordance with the requirements of the Contract Documents. The Notice to Proceed will customarily identify a Contract Completion Date.

Owner: The public body with whom the Contractor has entered into a contractual agreement and for whom the Work or services is to be provided. The term "Owner", as used herein, shall also mean the Agency.

Person: This term includes any individual, corporation, partnership, association, company, business, trust, joint venture, or other legal entity.

Plans: The term used to describe the group or set of project-specific drawings which are included in the Contract Documents.

Project: The term used instead of the specific or proper assigned title of the entire undertaking which includes, but is not limited to, the "Work" described by the Contract Documents.

Project Inspector: One or more persons employed by the Owner to inspect the Work for the Owner and/or to document and maintain records of activities at the Site to the extent required by the Owner. The Owner shall notify the Contractor in writing of the appointment of such Project Inspector(s). The scope of the Project Inspector's authority with respect to the Contractor is limited to that indicated in Section 16 (e) and (f) and as supplemented by the Owner in writing to the Project Inspector and to the Contractor.

Project Manager: The Project Manager as used herein shall be the Owner's designated representative on the Project. The Project Manager shall be the person through whom the Owner generally conveys written decisions and notices. All notices due the Owner and all information required to be conveyed to the Owner shall be conveyed to the Project Manager. The scope of the Project Manager's authority is limited to that authorized by the Owner, who shall provide written information to the Contractor at the Preconstruction meeting defining those limits. Upon receipt of such information, the Contractor shall be on notice that it cannot rely on any decisions of the Project Manager outside the scope of his authority. Nothing herein shall be construed to prevent the Owner from issuing any notice directly to the Contractor. The Owner may change the Project Manager from time to time and may, in the event that the Project Manager is absent, disabled or otherwise temporarily unable to fulfill his duties, appoint an interim Project Manager.

Provide: Shall mean furnish and install ready for its intended use.

Site: Shall mean the location at which the Work is performed or is to be performed.

Specifications: That part of the Contract Documents containing the written administrative requirements and the technical descriptions of materials, equipment, construction systems, standards, and workmanship which describe the proposed Work in sufficient detail and provide sufficient information for the Building Official to determine code compliance and for the Contractor to perform the Work. (The General Conditions, any Supplemental General Conditions, various bidding information and instructions, and blank copies of various forms to be used during the execution of the Work are usually bound with the Specifications.)

Subcontractor: A person having a direct contract with Contractor or with any other Subcontractor for the performance of the Work. Subcontractor includes any person who provides on-site labor but does not include any person who only furnishes or supplies materials for the Project.

Submittals: All shop, fabrication, setting and installation drawings, diagrams, illustrations, schedules, samples, and other data required by the Contract Documents which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by the Contractor to illustrate material or equipment conformance of some portion of the Work with the requirements of the Contract Documents.

Substantial Completion: The condition when the Owner agrees that the Work, or a specific portion thereof, is sufficiently complete, in accordance with the Contract Documents, so that it can be utilized by the Owner for the purposes for which it was intended. The Owner at its sole discretion may, after obtaining the necessary approvals and certificates, take Beneficial Occupancy at this time or choose to wait to occupy until after Final Completion is achieved.

Supplemental General Conditions: That part of the Contract Documents which amends or supplements the General Conditions.

Supplier: A manufacturer, fabricator, distributor, material-man or vendor who provides material for the Project but does not provide on-site labor.

Time for Completion: The number of consecutive calendar days following the issuance of the Notice to Proceed which the Contractor has to substantially complete all Work required by the Contract. When the Notice to Proceed is issued, it states a Contract Completion Date, which has been set by the Owner based on the Time for Completion.

Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which are or have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Work: The services performed under this Contract including, but not limited to, furnishing labor, and furnishing and incorporating materials equipment into the construction. The Work also includes the entire completed construction, or the various separately identifiable parts thereof, required to be provided under the Contract Documents or which may reasonably expected to be provided as part of a complete, code compliant and functioning system for those systems depicted in the plans and specifications.

2. CONTRACT DOCUMENTS

- (a) The Contract Between Owner and Construction Manager "At Risk" (CO-9CM), the Workers' Compensation Certificate of Coverage (CO-9a), the Standard Performance Bond (CO-10), the Standard Labor and Material Payment Bond (CO-10.1), the Schedule of Values and Certificate for Payment (CO-12), the Affidavit of Payments of Claims (CO-13), the Contractor's Certificate of Substantial Completion (CO-13.2a), and the Contractor's Certificate of Completion (CO-13.2) issued by the Commonwealth of Virginia in its Construction and Professional Services Manual are

forms incorporated in these General Conditions by reference and are made a part hereof to the same extent as though fully set forth herein. They must be used by the Contractor for their respective purposes.

- (b) All time limits stated in the Contract Documents, including but not limited to the Time for Completion of the Work, are of the essence of the Contract.
- (c) The Contract Between Owner and Contractor shall be signed by the Owner and the Contractor in as many original counterparts as may be mutually agreed upon, each of which shall be considered an original.
- (d) Anything called for by one of the Contract Documents and not called for by the others shall be of like effect as if required or called for by all, except that a provision clearly designed to negate or alter a provision contained in one or more of the other Contract Documents shall have the intended effect. In the event of conflicts among the Contract Documents, the Contract Documents shall take precedence in the following order: the Contract between Owner and Contractor; the Supplemental General Conditions; the General Conditions; the Special Conditions; the specifications with attachments; and the plans.
- (e) If any provision of this Contract shall be held invalid by any court of competent jurisdiction, such holding shall not invalidate any other provision.
- (f) All correspondence, invoices, memoranda, submittals and other documents related to this Project whether generated by the Owner, the A/E, the Contractor or others should be identified at the beginning of the document with the eight digit (XXX-XXXXX-XXX) Project Code Number. Additional identification such as a job number, purchase order number or such may also be shown at the generator's option.

3. LAWS AND REGULATIONS

- (a) The Contractor shall comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work and shall give all notices required thereby. The Contractor shall assure that all Subcontractors and tradesmen who perform Work on the project are properly licensed by the Department of Professional and Occupational Regulation as required by Title 54.1, Chapter 11, Articles 1 and 3 and by applicable regulations.
- (b) This Contract and all other contracts and subcontracts are subject to the provisions of Articles 3 and 5, Chapter 4, Title 40.1, Code of Virginia, relating to labor unions and the "right to work." The Contractor and its Subcontractors, whether residents or nonresidents of the Commonwealth, who perform any Work related to the Project shall comply with all of the said provisions.
- (c) IMMIGRATION REFORM AND CONTROL ACT OF 1986: By signing this Contract, the Contractor certifies that it does not and will not during the performance of this Contract violate the provisions of the Federal Immigration Reform and Control Act of 1986, which prohibits employment of illegal aliens.
- (d) The provisions of all rules and regulations governing safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia and as issued by the Department of Labor and Industry under Title 40.1 of the Code of Virginia shall apply to all Work under this Contract. Inspectors from the Department of Labor and Industry shall be granted access to the Work for inspection without first obtaining a search or administrative warrant.
- (e) Building Permit: Because this Project is on Commonwealth of Virginia property, codes or zoning ordinances of local political subdivisions do not apply to Work on the property. The Virginia Uniform Statewide Building Code applies to the Work and is administered by the Building Official for State-owned Buildings. The Building Permit will be obtained and paid for by the Owner. All

other permits, local license fees, business fees, taxes, or similar assessments imposed by the appropriate political subdivision shall be obtained and paid for by the Contractor. See Section 25 for utility connection fees and services.

- (f) The Contractor shall include in each of its subcontracts a provision requiring each Subcontractor to include or otherwise be subject to the same payment and interest requirements in Subsections (a), (b), and (c) of Section 37 of these General Conditions with respect to each lower-tier Subcontractor and Supplier.
- (g) The Contractor, if not licensed as an asbestos abatement contractor in accordance with §54.1-514, Code of Virginia, shall have all asbestos-related Work performed by subcontractors who are duly licensed as asbestos contractors for the Work required.
- (h) Lead Based Paint Activities: If the Contract Documents indicate that lead based paint is present on existing materials, components, or surfaces, the Contractor shall conform to the following:
 - (1) The requirements set forth in 59 Federal Register 45,872 (September 2, 1994) Proposed Rule) - *Lead; Requirements for Lead based Paint Activities (Proposed Rules)* in selecting and performing the means, methods and procedures for performing the Work. This includes, but is not limited to, training of personnel, lead abatement, encapsulation of lead containing materials, removal and handling of lead containing materials, and methods of disposal. When the Final Rule, to be codified at 40 CFR 745, supersedes the Proposed Rule, the Contractor shall be responsible for conforming to the Final Rule, as of the effective date set forth therein.
 - (2) The requirements for employee protection contained in 29 CFR Part 1926, Subpart D, and the requirements for record-keeping contained 29 CFR Part 1910.
 - (3) The Virginia Department of Labor and Industry's (DLI) Emergency Regulation published in the May 27, 1996 Virginia Register, requiring, among other things, that a permit be issued to the lead abatement contractor, or any subsequent regulation issued by DLI.
- (i) If the Contractor violates laws or regulations that govern the Project, the Contractor shall indemnify and hold the Owner harmless against any fines and/or penalties that result from such violation. To the extent that such violation is the result of negligence or other actionable conduct of the Contractor, the Contractor shall indemnify and hold the Owner harmless against any third party claims, suits, awards, actions, causes of action or judgments, including but not limited to attorney's fees and costs incurred thereunder, that result from such violation.
- (j) If the Work includes any land disturbing activities, the Contractor shall have on-site an individual certified by the Department of Conservation and Recreation as a Responsible Land Disturber in accordance with §10.1-563, Code of Virginia

4. NONDISCRIMINATION

- (a) §2.2-4311 of the Code of Virginia shall be applicable. It provides as follows:

“1. During the performance of this Contract, the Contractor agrees as follows:

- a. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
- b. The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such Contractor is an equal opportunity employer.

- c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.
- 2. The Contractor will include the provisions of the foregoing paragraphs a, b and c in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor."
- (b) Where applicable, the Virginians with Disabilities Act and the federal Americans with Disabilities Act shall apply to the Contractor and all Subcontractors.

5. PROHIBITION OF ALCOHOL AND OTHER DRUGS

- (a) §2.2-4312 of the Code of Virginia shall be applicable. It provides as follows:
"During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor. For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor in accordance with this chapter, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract."
- (b) The Contractor shall also establish, maintain and enforce policies which prohibit the following acts by all Contractor, Subcontractor and Supplier personnel at the Site:
 - (1) The manufacture, distribution, dispensation, possession, or use of alcohol, marijuana or other drugs, except possession and medically prescribed use of prescription drugs; and
 - (2) The impairment of judgment or physical abilities due to the use of alcohol, marijuana or other drugs, including impairment from prescription drugs.

6. TIME FOR COMPLETION

- (a) The Time for Completion shall be designated by the Owner on the Request for Proposals or other proposal documents. In some instances, the Time for Completion may be stated on the Request for Proposal or other pre-proposal document in the form of a Contract Completion Date. The Work must be substantially completed by the Time for Completion or the Contract Completion Date. Unless otherwise specified, the Contractor shall achieve Final Completion within thirty (30) days after the date of Substantial Completion.
- (b) The Time for Completion shall be stated in the Contract between Owner and Contractor and shall become a binding part of the Contract upon which the Owner may rely in planning the use of the facilities to be constructed and for all other purposes. If the Contractor fails to substantially complete the Work within the Time for Completion or Contract Completion Date, as set forth in the Contract, he shall be subject to payment of actual damages incurred by the Owner or liquidated damages, if provided for in the Contract.
- (c) The Contractor, in submitting his proposal, acknowledges that he has taken into consideration normal weather conditions. Normal weather does not mean statistically average weather, but rather means a range of weather patterns which might be anticipated based on weather data for the past ten (10) years, (i.e., conditions which are not extremely unusual). Normal weather conditions shall be determined from the public historical records available, including the U.S. Department of Commerce, Local Climatological Data Sheets, National Oceanic and Atmospheric Administration /

Environmental Data and Information Service, National Climatic Center and National Weather Service. The data sheets to be used shall be those for the locality or localities closest to the site of the work. No additional compensation will be paid to the Contractor because of adverse weather conditions; however, an extension of time for abnormal weather will be considered by the Owner under the following conditions, all of which must be strictly complied with by the contractor:

- (1) The request for additional time shall be further substantiated by weather data collected during the period of delay at the Site. Said data must demonstrate that an actual departure from normal weather occurred at the Site during the dates in question.
- (2) The extension requested must be supported by a delay in completion of the entire Project shown on the critical path of the accepted CPM Schedule or the approved bar graph schedule required for the Project. Extensions will be granted only for delays in completion of the Project, not for that portion of any delay which consumes only "float" time.
- (3) A request for extension of time based on abnormal weather must be made in writing within five (5) calendar days of the completion of the calendar month during which abnormal weather is claimed at the Site.
- (4) All of the evidence and data supporting the request (including both historical data and the recordings at the Site during the time of delay) must be furnished to the Owner before any consideration will be given to the request. That supporting data shall be submitted by the end of the calendar month following the month for which the request is made.
- (d) The failure by the Contractor to comply with any and all of the conditions in (c) above shall constitute a waiver of claims for the extension of time for abnormal weather.
- (e) The Contractor represents and agrees that he has taken into account in his proposal the requirements of the proposal documents, local conditions, availability of materials, equipment, and labor, and any other factors which may affect the performance of the Work. The Contractor agrees and warrants that he will achieve Substantial Completion of the Work to allow the Owner to have Beneficial Occupancy not later than the Time for Completion or Contract Completion Date. The Contractor agrees and warrants that he will achieve Final Completion of the Work (the entire completion of all Work, including "punch list" items), not later than thirty (30) days after achieving Substantial Completion.

7. CONDITIONS AT SITE

- (a) The Contractor shall have visited the Site prior to submitting its proposal and is totally responsible for having ascertained pertinent local conditions such as location, accessibility and general character of the Site, and the character and extent of existing improvements and work within or adjacent to the Site. Claims which result from the Contractor's failure to do so will be deemed waived.
- (b) If, in the performance of the Contract, hidden physical conditions of a building being modified are exposed revealing unusual or materially different conditions from those ordinarily encountered or inherent in work of this nature, or if subsurface or latent conditions at the Site are found which are materially different from those frequently present in the locality or from those indicated in the Contract Documents, the Contractor must report such conditions to the Owner and to the Architect/Engineer before the conditions are disturbed. Upon such notice, or upon his own observation of such conditions, the Architect/Engineer shall promptly propose such changes in the Contract Documents as he finds necessary to conform to the different conditions. Any change in the cost of the Work or additional time needed for completion must be requested pursuant to Sections 38, 39 and/or 43 of these General Conditions.

- (c) If the Contractor, during the course of the Work, observes the existence of any material which he knows, should know, or has reason to believe is hazardous to human health, the Contractor shall promptly notify the Owner. The Owner will provide the Contractor with instructions regarding the disposition of the material. The Contractor shall not perform any Work involving the material or any Work causing the material to be less accessible prior to receipt of special instructions from the Owner.

8. CONTRACT SECURITY

- (a) For contracts with a value exceeding one hundred thousand dollars (\$100,000), the Contractor shall deliver to the Owner or its designated representative, a Commonwealth of Virginia Standard Performance Bond, DGS-30-084 (Form CO-10) and a Commonwealth of Virginia Standard Labor and Material Payment Bond, DGS-30-088 (Form CO-10.1) each fully executed by the Contractor and one or more surety companies legally licensed to do business in Virginia and each in an amount equal to one hundred percent (100%) of the accepted bid. If more than one Surety executes a bond, each shall be jointly and severally liable to the Owner for the entire amount of the bond. Sureties shall be selected by the Contractor, subject to approval by the Owner. No payment on the Contract shall be due and payable to the Contractor until the bonds have been approved by the Owner and the Office of the Attorney General of Virginia. In order to facilitate review of the bonds by the Office of the Attorney General, the power of attorney from the surety company to its agent who executes the bond shall be attached to the bond, or if not so attached, prior to the execution of the bonds by the surety, recorded in the Office of the Clerk of Court for the City of Richmond, Virginia, at the John Marshall Court Building, 400 North Ninth Street, except when the Owner is one of the following, in which case the power of attorney must be recorded with the Clerk of Court in the place shown:

<u>OWNER</u>	<u>PLACE OF RECORDATION</u>
University of Virginia	City of Charlottesville
Old Dominion University	City of Norfolk
Norfolk State University	City of Norfolk
Christopher Newport University	City of Newport News
Virginia Polytechnic Institute and State University	County of Montgomery

- (b) For the purposes of all Standard Labor and Material Payment Bonds entered into, the term "subcontractors" as used in §2.2-4337.A.2. of the Code of Virginia is interpreted to mean any contractors who participated in the prosecution of the Work undertaken by the Contractor (referred to in §2.2-4337. A.2. of the Code of Virginia as the "prime contractor"), whether such contractor had a direct contract with the Contractor (prime contractor) or whether there were one or more other intervening Subcontractors contractually positioned between it and the Contractor (prime contractor).
- (c) See §2.2-4338 of the Code of Virginia, for alternative forms of security for payment and/or performance bonds.
- (d) For contracts with a value of less than one hundred thousand dollars (\$100,000), the Contractor will not be required to provide a Standard Performance Bond and a Standard Labor and Material Payment Bond as described above unless the Request for Proposal states that such bonds will be required.

9. SUBCONTRACTS

- (a) The Contractor shall, as soon as practicable after the signing of the Contract, notify the Owner and Architect/Engineer in writing of the names of all Subcontractors proposed for the principal parts of the Work and of such others as the Architect/Engineer may direct. Where the specifications establish qualifications or criteria for Subcontractors, manufacturers, or individuals performing Work on the Project, the Contractor shall be responsible for ascertaining that those proposed meet the criteria or qualifications. The Contractor shall not employ any Subcontractor that the Owner may, within a reasonable time, object to as unsuitable. Neither the Owner nor the Architect/Engineer shall direct the Contractor to contract with any particular Subcontractor unless provided in the specifications or Invitation for Bids.
- (b) The Owner may select a particular Subcontractor for a certain part of the Work and designate on the Invitation for Bids that the Subcontractor shall be used for the part of the Work indicated and that the Subcontractor has agreed to perform the Work for the subcontract amount stipulated on the bid form. The Contractor shall include the stipulated amount plus his Contractor markups in the bid. In such case, the Contractor shall be responsible for that Subcontractor and its work and the Subcontractor shall be responsible to the Contractor for its work just as if the Contractor had selected the Subcontractor.
- (c) The Owner shall, on request, furnish to any Subcontractor, if practicable, the amounts of payments made to the Contractor, the Schedule of Values and Requests for Payment submitted by the Contractor and any other documentation submitted by the Contractor which would tend to show what amounts are due and payable by the Contractor to the Subcontractor.
- (d) The Contractor shall be fully responsible to the Owner for all acts and omissions of his agents and employees and all succeeding tiers of Subcontractors and Suppliers performing or furnishing any of the Work. Nothing in the Contract Documents shall create any contractual relationship between Owner or Architect/Engineer and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of Owner or Architect/Engineer to pay for or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization, except as may otherwise be required by law.
- (e) The Contractor shall be fully responsible for his invitees at the Site and for those of his Subcontractors, Suppliers, and their employees, including any acts or omissions of such invitees.
- (f) The Contractor agrees that he alone is responsible for all dealings with his Subcontractors and Suppliers, and their subcontractors, employees and invitees, including, but not limited to, the Subcontractors' or Suppliers' claims, demands, actions, disputes and similar matters unless specifically provided otherwise by the Contract or by statute.

10. SEPARATE CONTRACTS

- (a) The Owner reserves the right to let other contracts in connection with the Project, the Work under which may proceed simultaneously with the execution of this Contract. The Contractor shall afford other separate contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work. The Contractor shall cooperate with them and shall take all reasonable action to coordinate his Work with theirs. If the Owner has listed other separate contracts in the Requests for Proposal which it expects to proceed simultaneously with the Work of the Contractor, and has included the estimated timing of such other Contracts in the Invitation for Bids or requests for the proposals, the Contractor shall integrate the schedule of those separate contracts into his scheduling. The Contractor shall make every reasonable effort to assist the Owner in maintaining the schedule for all separate contracts. If the work performed by the separate contractor is defective or performed so as to prevent or threaten to prevent the Contractor from carrying out his Work according to the Contract, the Contractor shall immediately notify the Owner and the Architect/Engineer upon discovering such conditions.

- (b) If a dispute arises between the Contractor and any separate contractor(s) as to their responsibility for cleaning up as required by Sections 31 (c) and 31 (d) of these General Conditions, the Owner may clean up and charge the cost thereof to the respective contractors in proportion to their responsibility. If a Contractor disputes the Owner's apportionment of clean-up costs, it shall be that contractor's burden to demonstrate and prove the correct apportionment.

11. CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

- (a) The Contractor shall not commence Work under this Contract until he has obtained all the insurance required hereunder from an insurer authorized to do business in Virginia and such insurance has been approved by the Owner; nor shall the Contractor allow any Subcontractor to commence Work on his subcontract until the same types of insurance in an appropriate amount have been obtained by the Subcontractor and approved by the Contractor. Approval of insurance by the Owner shall not relieve or decrease the liability of the Contractor hereunder.
- (b) The Contractor shall take out, and shall maintain in force at all times during the performance of the Work, Workers' Compensation and Employers' Liability Insurance for all of his employees engaged in the Work in an amount not less than the minimum required by §2.2-4332 and §65.2-100 et seq. of the Code of Virginia. In case any of the Work is sublet, the Contractor shall require each Subcontractor similarly to provide Workers' Compensation and Employers' Liability Insurance for all of the latter's employees to be engaged in the Work. Prior to award of the Contract, the Contractor shall submit on the form provided by the Owner, Certificate of Coverage verifying Workers Compensation coverage. The Contractor shall likewise obtain a Certificate of Coverage for Workers' Compensation coverage from each subcontractor prior to awarding the subcontract and shall provide a copy to the Owner.
- (c) During the performance of the Work under this Contract, the Contractor shall maintain commercial general liability insurance to include Premises / Operations Liability, Products and Completed Operations Coverage, Independent Contractor's Liability, Owner's and Contractor's Protective Liability, and Personal Injury Liability, which shall insure him against claims of personal injury, including death, as well as against claims for property damage, which may arise from operations under this Contract, whether such operations be by himself or by any Subcontractor, or by anyone directly or indirectly employed by either of them. The amounts of general liability insurance shall be not less than **\$1,000,000** per occurrence and **\$2,000,000** aggregate combined limit. The Commonwealth of Virginia, its officers, employees and agents, shall be named as an additional insured with respect to the Work being procured. The Supplemental General Conditions may require the Contractor to provide an Umbrella insurance policy in a specified amount for the Project.
- (d) During the performance of the Work under this Contract, the Contractor shall maintain automobile liability insurance which shall insure him against claims of personal injury, including death, as well as against claims for property damage, which may arise from operations under this Contract, whether such operations be by himself or by any Subcontractor, or by anyone directly or indirectly employed by either of them. The amounts of automobile insurance shall be not less than **\$1,000,000** combined limit for bodily injury and property damage per occurrence.
- (e) The Asbestos Contractor or Subcontractor, as the case may be, shall provide occurrence-based liability insurance with asbestos coverages in an amount not less than **\$1,000,000** and shall name the following as additional insured: The Commonwealth of Virginia, its officers, its employees and its agents; the Architect/Engineer (if not the Asbestos Project Designer); and the Contractor (where the asbestos work is being performed by the Asbestos Subcontractor).

12. "ALL RISK" BUILDER'S RISK INSURANCE

- (a) The Contractor, at his cost, shall obtain and maintain in the names of the Owner and the Contractor "all-risk" builder's risk insurance (or fire, extended coverage, vandalism and malicious mischief insurance, if approved by the Owner and the Director, Division of Engineering and Buildings) upon the entire structure or structures on which the Work of this Contract is to be done and upon all material in or adjacent thereto which is intended for use thereon, to one hundred percent (100%) of the insurable value thereof. Such insurance may include a deductible provision if the Owner so provides in the Supplemental General Conditions, in which case the Contractor will be liable for such deductions, whenever a claim arises. The loss, if any, is to be made adjustable with and payable to the Owner, in accordance with its interests, as they may appear. The Owner, its officers, employees and its agents, shall be named as an additional insured in any policy of insurance issued. Written evidence of the insurance shall be filed with the Owner no later than thirty (30) days following the award of the Contract. In the event of cancellation of this insurance, not less than thirty (30) days prior written notice must be sent to the Owner. A copy of the policy of insurance shall be given to the Owner upon demand.
- (b) The value of the builder's risk insurance shall exclude the costs of excavations, backfills, foundations, underground utilities and Sitework.
- (c) The Owner maintains insurance coverage on its buildings. On re-roofing, renovation, and interior modifications of existing building projects where the Owner continues to occupy the building, or a portion thereof, while the Work is being performed, the Contractor shall provide "all risk" builders risk insurance, as describe above, in an amount equal to one hundred percent (100%) of the Contract Price for the Work. In those instances, the Supplemental General Conditions for the project shall expressly exclude the project from the requirements of Subsection 12(a). The Contractor is responsible for providing any desired coverage for Contractor's or Subcontractors' buildings, equipment, materials, tools or supplies that are on-site.
- (d) Any insurance provided through the Department of Treasury, Division of Risk Management, on buildings, construction, additions or renovations will not extend to Contractor's nor Subcontractors' buildings, equipment, materials, tools or supplies unless these items are to become property of the Owner upon completion of the Project and the Owner has assumed responsibility for such items at the time of the loss.

13. TAXES, FEES AND ASSESSMENTS

The Contractor shall, without additional expense to the Owner, pay all applicable federal, state, and local taxes, fees, and assessments except the taxes, fees and assessments on the real property comprising the Site of the project. If the State Building Official elects to have the local building official inspect the Work as provided by §36-98.1 of the Code of Virginia, the Owner shall pay the resulting fees to the local building official.

14. PATENTS

The Contractor shall obtain all licenses necessary to use any invention, article, appliance, process or technique of whatever kind and shall pay all royalties and license fees. The Contractor shall hold the Owner, its officers, agents and employees, harmless against any loss or liability for or on account of the infringement of any patent rights in connection with any invention, process, technique, article or appliance manufactured or used in the performance of the Contract, including its use by the Owner, unless such invention, process, technique, article or appliance is specifically named in the specifications or plans as acceptable for use in carrying out the Work. If, before using any invention, process, technique, article or appliance specifically named in the specifications or plans as acceptable for use in carrying out the Work, the Contractor has or acquires information that the same is covered by letters of patent making it necessary to secure the permission of the patentee, or other, for the use of the same, he shall promptly advise the Owner and the Architect/Engineer. The Owner may direct that some other invention, process, technique,

article or appliance be used. Should the Contractor have reason to believe that the invention, process, technique, article or appliance so specified is an infringement of a patent, and fail to inform the Owner and the Architect/Engineer, he shall be responsible for any loss or liability due to the infringement.

15. ARCHITECT/ENGINEER'S STATUS

- (a) The Architect/Engineer shall have authority to endeavor to secure the faithful performance by Owner and Contractor of the Work under the Contract. He shall review the Contractor's Submittals for conformance to the requirements of the Contract Documents and return copies to the Contractor with appropriate notations. He shall interpret the requirements of the plans and specifications and issue Field Orders to the Contractor as may be required. He shall recommend to the Owner suspension of the Work (in whole or in part) whenever such suspension may be necessary to ensure the proper execution of the Contract. He shall have authority to reject, in writing, Work, including material, installation or workmanship, which does not conform to the requirements of the plans and specifications. He shall determine the progress and quality of the Work, subject to the right of the Owner to make an overriding decision to the contrary. Upon request by the Contractor, the Architect/Engineer shall confirm, in writing within ten (10) days, any oral order or determination made by him.
- (b) The Architect/Engineer shall have no authority to approve or order changes in the Work which alter the design concept or which call for an extension of time or a change in the Contract Price.
- (c) Although the Owner is bound by the terms of the Contract with the Contractor, including the plans and specifications, the Owner shall have the right, but not the duty, to countermand any decision of the Architect/Engineer and to follow or reject the advice of the Architect/Engineer, including but not limited to acceptance of the Work, as it deems best. In those instances where the Architect/Engineer has been given authority to act, the Architect/Engineer shall promptly do so, but in the case of disagreement between the Architect/Engineer and the Owner, the decision of the Owner shall be final. The Contractor shall not be bound by any determination, interpretation or decision of the Architect/Engineer, if it is later determined that the same is not in accord with the Contract Documents. The party taking issue with the determination, interpretation or decision of the Architect/Engineer shall give the other party written notice of such fact within ten (10) days after the determination, interpretation or decision is communicated by the Architect/Engineer. In the actual performance of the Work, however, the Contractor shall, in the first instance, proceed in accordance with instructions given by the Architect/Engineer unless the Owner and the Contractor mutually agree that the Contractor shall proceed otherwise.
- (d) All orders from the Owner to the Contractor shall either be transmitted through the Architect/Engineer or communicated directly to the Contractor and the Architect / Engineer by the Owner.
- (e) Should the Owner choose to employ another or different Architect / Engineer, the status of the Architect/Engineer so employed shall be the same as that of the former Architect/Engineer.
- (f) The Architect/Engineer will provide to the Owner and the Contractor after each visit to the Site, a written report indicating the date, time of day, weather conditions and the names of the persons representing the Architect/Engineer who participated in the visit. The report will advise the Owner of any problems that were noted and shall compare the Architect/Engineer's observations of the actual progress of the Work with that reported by the Contractor. On the basis of his on-Site observations as Architect/Engineer, he will make every reasonable effort to guard the Owner against defects and deficiencies in the Work of the Contractor. He shall have the authority to inspect the Work, to note and report Defective Work and deviations from the Contract Documents to the Owner, to reject same, and to recommend to the Owner the suspension of the Work when necessary to prevent Defective Work from proceeding or being covered.

- (g) The Architect/Engineer shall not be responsible for construction means, methods, techniques, sequences or procedures (other than those expressly specified in Contract Documents), or for safety precautions and programs in connection with the Work, and he shall not be responsible for the Contractor's failure to carry out the Contractor's own responsibilities.
- (h) The Architect/Engineer generally conveys written decisions and notices to the Contractor through the Project Manager and shall generally receive information and Notices from the Contractor through the Project Manager unless otherwise agreed. The Owner may delegate from the Architect/Engineer to the Project Manager certain inspection, verification, acceptance, rejection, and administrative duties and authority, but any such delegation shall be in writing and a copy thereof provided to the Contractor.
- (i) The provisions of this section are included as information only to describe the relationship between the Owner, A/E, and Contractor. No failure of the A/E to act in accordance with this section shall relieve the Contractor from his obligations under the Contract or create any rights in favor of the Contractor.

16. INSPECTION

- (a) All material and workmanship shall be subject to inspection, examination and testing by the Owner, the Architect/Engineer, the Project Inspector, authorized inspectors and authorized independent testing entities at any and all times during manufacture and/or construction. The Architect/Engineer and the Owner shall have authority to reject defective material and workmanship and require its correction. Rejected workmanship shall be satisfactorily corrected and rejected material shall be satisfactorily replaced with proper material without charge therefor, and the Contractor shall promptly segregate and remove the rejected material from the Site. If the Contractor fails to proceed at once with replacement of rejected material and/or the correction of defective workmanship, the Owner may, by contract or otherwise, replace such material and/or correct such workmanship and charge the cost to the Contractor, or may terminate the right of the Contractor to proceed as provided in Section 41 of these General Conditions, the Contractor and surety being liable for any damage to the same extent as provided in Section 41 for termination thereunder.
- (b) Site inspections, tests conducted on Site or tests of materials gathered on Site, which the Contract requires to be performed by independent testing entities, shall be contracted and paid for by the Owner. Examples of such tests are the testing of cast-in-place concrete, foundation materials, soil compaction, pile installations, caisson bearings and steel framing connections. The Contractor shall promptly furnish, without additional charge, all reasonable facilities, labor and materials necessary and convenient for making such tests. Except as provided in (d) below, whenever such examination and testing finds defective materials, equipment or workmanship, the Contractor shall reimburse the Owner for the cost of reexamination and retesting. Although conducted by independent testing entities, the Owner will not contract and pay for tests or certifications of materials, manufactured products or assemblies which the Contract, codes, standards, etc., require to be tested and/or certified for compliance with industry standards such as Underwriters Laboratories, Factory Mutual or ASTM. If fees are charged for such tests and certifications, they shall be paid by the Contractor. The Contractor shall also pay for all inspections, tests, and certifications which the Contract specifically requires him to perform or to pay, together with any inspections and tests which he chooses to perform for his own purposes, but are not required by the Contract.
- (c) Where Work is related to or dependent on the Defective Work, the Contractor shall stop such related or dependent Work until the Defective Work or deficiency is corrected or an alternative solution is presented that is satisfactory to the Owner. Where Work is rejected because of defective material or workmanship, the Contractor shall stop like Work in other areas or locations on the Project until the matter is resolved and the Owner has approved corrective measures.

- (d) Should it be considered necessary or advisable by Owner or the Architect/Engineer at any time before final acceptance of the entire Work to make an examination of any part of the Work already completed, by removing or tearing out portions of the Work, the Contractor shall on request promptly furnish all necessary facilities, labor and material to expose the Work to be tested to the extent required. If such Work is found to be defective in any respect, due to the fault of the Contractor or his Subcontractors, the Contractor shall bear all the expenses of uncovering the Work, of examination and testing, and of satisfactory reconstruction. If, however, such Work is found to meet the requirements of the Contract, the actual cost of the Contractor's labor and material necessarily involved in uncovering the Work, the cost of examination and testing, and Contractor's cost of material and labor necessary for replacement including a markup of fifteen (15%) percent for overhead and profit shall be paid to the Contractor and he shall, in addition, if completion of the Work has been delayed thereby, be granted a suitable extension of time. Notwithstanding the foregoing, the Contractor shall be responsible for all costs and expenses in removing and replacing the Work if the Contractor had covered the Work prior to any inspection or test contrary to the instructions of the A/E, Owner or Project Inspector.
- (e) The Project Inspector has the authority to recommend to the Architect/Engineer and the Owner that the Work be suspended when in his judgment the Contract Documents are not being followed. Any such suspension shall be continued only until the matter in question is resolved to the satisfaction of the Owner. The cost of any such Work stoppage shall be borne by the Contractor unless it is later determined that no fault existed in the Contractor's Work.
- (f) The Project Inspector has the right and the authority to:
 - (1) Inspect all construction materials, equipment, and supplies for quality and for compliance with the Contract Documents and/or approved shop drawings and Submittals.
 - (2) Inspect workmanship for compliance with the standards described in the Contract Documents.
 - (3) Observe and report on all tests and inspections performed by the Contractor.
 - (4) Recommend rejection of Work which does not conform to requirements of the Contract Documents.
 - (5) Keep a record of construction activities, tests, inspections, and reports.
 - (6) Attend all joint Site construction meetings and inspections held by the Owner and/or the A/E with the Contractor.
 - (7) Check materials and equipment, together with documentation related thereto, delivered for conformance with approved Submittals and the Contract.
 - (8) Check installations for proper workmanship and conformance with shop drawing and installation instructions.
 - (9) Assist in the review and verification of the CO-12, Schedule of Values & Certificate for Payment, submitted by the Contractor each month.
 - (10) Do all things for or on behalf of the Owner as the Owner may subsequently direct in writing.
- (g) The Project Inspector has no authority to:
 - (1) Authorize deviations from the Contract Documents;
 - (2) Enter into the area of responsibility of the Contractor's superintendent;

- (3) Issue directions relative to any aspect of construction means, methods, techniques, sequences or procedures, or in regard to safety precautions and programs in connection with the Work;
- (4) Authorize or suggest that the Owner occupy the Project, in whole or in part; or
- (5) Issue a certificate for payment.
- (h) The duties of the Project Inspector are for the benefit of the Owner only and not for the Contractor. The Contractor may not rely upon any act, statement, or failure to act on the part of the Project Inspector, nor shall the failure of the Project Inspector to properly perform his duties in any way excuse Defective Work or otherwise improper performance of the Contract by the Contractor.

17. SUPERINTENDENCE BY CONTRACTOR

- (a) The Contractor shall have a competent foreman or superintendent, satisfactory to the Architect/Engineer and the Owner, on the Site at all times during the progress of the Work. The superintendent or foreman shall be familiar with and be able to read and understand the plans and specifications, and be capable of communicating orally and in writing with the Owner's inspectors and the Contractor's workers. The Contractor shall be responsible for all construction means, methods, techniques, sequences and procedures, for coordinating all portions of the Work under the Contract except where otherwise specified in the Contract Documents, and for all safety and worker health programs and practices. The Contractor shall notify the Owner, in writing, of any proposed change in superintendent, including the reason therefor, prior to making such change.
- (b) The Contractor shall, at all times, enforce strict discipline and good order among the workers on the Project, and shall not employ on the Work, or contract with, any unfit person, anyone not skilled in the Work assigned to him, or anyone who will not work in harmony with those employed by the Contractor, the Subcontractors, the Owner or the Owner's separate contractors and their subcontractors.
- (c) The Owner may, in writing, require the Contractor to remove from the Site any employee or Subcontractor's employee the Owner deems to be incompetent, careless, not working in harmony with others on the Site, or otherwise objectionable, but the Owner shall have no obligation to do so.

18. CONSTRUCTION SUPERVISION, METHODS AND PROCEDURES

- (a) The Contractor shall be solely responsible for supervising and directing the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction and for coordinating all portions of the Work under the Contract, except where otherwise specified in the Contract Documents. However, the Contractor shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract. The Contractor is solely responsible to the Owner that the finished Work complies with the Contract Documents.

The Contractor shall be solely responsible for health and safety precautions and programs for workers and others in connection with the Work. No inspection by, knowledge on the part of, or acquiescence by the Architect or Engineer, the Project Inspector, the Owner, the Owner's employees and agents, or any other entity whatever shall relieve the Contractor from its sole responsibility for compliance with the requirements of the Contract or its sole responsibility for health and safety programs and precautions.

- (b) If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the Contractor may furnish or utilize a substitute means,

method, sequence, technique or procedure of construction acceptable to Architect/Engineer, subject to the Owner's right to disapprove. The Contractor must submit its written request for the substitution to the Architect/Engineer with sufficient information to allow the Architect/Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract.

- (c) The divisions and sections of the Specifications and the identification of any drawings shall not control the Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

19. SCHEDULE OF THE WORK

- (a) **General:** The Contractor is responsible for the scheduling and sequencing of the Work, for coordinating the Work, for monitoring the progress of the Work, and for taking appropriate action to keep the Work on schedule. The Contractor may attempt to achieve Substantial Completion on or before the Time for Completion or the Contract Completion Date established by the Contract and receive payment in accordance with Section 36 for the Work completed each period. However, the date established by the Contract Documents as the deadline for achieving Substantial Completion must be used in all schedules as the date on which Substantial Completion will be achieved. The time (in days) between the Contractor's planned early completion and the contracted Time for Completion is part of the Project "Total Float" time and will be used as such. Extensions of time pursuant to Sections 38, 39, and 43, damages for delay, and all other matters between the Owner and the Contractor will be determined using the contractually required Substantial Completion date, not an early Substantial Completion date planned by the Contractor.

Within two (2) weeks after the Contractor signs the Contract Between Owner and Contractor, unless otherwise extended by the Owner at the time of the signing, the Contractor shall prepare and submit to the Owner, with a copy to the Architect/Engineer, a preliminary bar graph schedule for accomplishing the Work based upon the Time for Completion stated in the Contract. The preliminary bar graph schedule shall be in sufficient detail to show the sequencing of the various trades for each floor level, wing or work area. The Owner will notify the Contractor of its acceptance of or objections to the preliminary schedule within fifteen (15) days of receipt by the Owner. A fully complete Project schedule for accomplishing the Work must be submitted in like manner no later than sixty (60) days after the Contract is signed by the Owner.

The Owner's failure to reject or its acceptance of any schedule, graph, chart, recovery schedule, updated schedule, plan of action, etc. shall not constitute an acknowledgement, representation or warranty by the Owner, including but not limited to an acknowledgement, representation or warranty that the schedule is feasible or practical nor shall any such acceptance or failure to reject relieve the Contractor from sole responsibility for completing the Work within the time allowed.

No progress payments will be payable to the Contractor until after it has submitted a preliminary schedule which is acceptable to the Owner. Neither the second progress payment nor any subsequent payment shall be payable to the Contractor until it has submitted a fully complete Project schedule accepted by the Owner. Nor shall subsequent progress payments be payable to the Contractor unless and until he submits the monthly bar graphs or status reports required by Section 19(d) herein or unless and until he provides any recovery schedule pursuant to Section 19(e) herein.

Failure to provide a satisfactory preliminary or fully complete Project schedule within the time limits stated above shall be a breach of contract for which the Owner may terminate the Contract in the manner provided in Section 41 of these General Conditions.

The fully complete Project schedule for accomplishing the Work shall be of the type set forth in subparagraph (1) or (2) below, as appropriate:

- (1) For Contracts with a price of \$1,500,000 or less, a bar graph schedule will satisfy the above requirement. The schedule shall indicate the estimated starting and completion dates for each major element of the work. See (b) below
- (2) For Contracts with a price over \$1,500,000, a Critical Path Method (CPM) schedule shall be utilized to control the planning and scheduling of the Work. The CPM schedule shall be the responsibility of the Contractor and shall be paid for by the Contractor. See (c) below

- (b) **Bar Graph Schedule:** Where a bar graph schedule is required, it shall be time-scaled in weekly increments, shall indicate the estimated starting and completion dates for each major element of the Work by trade and by area, level, or zone, and shall schedule dates for all salient features, including but not limited to the placing of orders for materials, submission of shop drawings and other Submittals for approval, approval of shop drawings by Architect/Engineer, the manufacture and delivery of material, the testing and the installation of materials, supplies and equipment, and all Work activities to be performed by the Contractor.

The Contractor shall allow sufficient time in his schedule for the A/E to conduct whatever associated reviews or inspections as may be required under the A/E's contract with the Owner. If the A/E and the Contractor are unable to agree as to what constitutes sufficient time, the Owner shall determine the appropriate duration for such Architect/Engineer activities. Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

It is the Contractor's responsibility to submit a schedule that shows Substantial Completion of the Work by the Contract Time for Completion or the Contract Completion Date and any interim deadlines established by the Contract.

- (c) **CPM Schedule:** Where a CPM schedule is required, it shall be in the time-scaled precedence format using the Contractor's logic and time estimates. The CPM schedule shall be drawn or plotted with activities grouped or zoned by Work area or subcontract as opposed to a random (or scattered) format.

The CPM schedule shall be time-scaled on a weekly basis and shall be drawn or plotted at a level of detail and logic which will schedule all salient features of the Work, including not only the actual construction Work for each trade, but also the submission of shop drawings and other Submittals for approval, approval of shop drawings by Architect/Engineer, placing of orders for materials, the manufacture and delivery of materials, the testing and installation of materials and equipment, and all Work activities to be performed by the Contractor. Failure to include any element of Work required for the performance of this Contract shall not excuse the Contractor from completing all Work required within the Time for Completion, Contract Completion Date and any interim deadlines established by the Contract.

The Contractor shall allow sufficient time in his schedule for the A/E to conduct whatever associated reviews or inspections as may be required under the A/E's contract with the Owner. If the A/E and the Contractor are unable to agree as to what constitutes sufficient time, the Owner shall determine the appropriate duration for such Architect/Engineer activities. Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

It is the Contractor's responsibility to submit a schedule that shows Substantial Completion of the Work by the Contract Time for Completion or the Contract Completion Date and any interim deadlines established by the Contract.

When completed, the CPM schedule shall be submitted to the Architect/Engineer and the Owner for review. The CPM schedule will identify and describe each activity, state the duration of each activity, the calendar dates for the early and late start and the early and late finish of each activity, and clearly highlight all activities on the critical path. "Total float" and "free float" shall be

indicated for all activities. Float time, whether "free float" or "total float" as defined in Section 1, shall not be considered for the exclusive use or benefit of either the Owner or the Contractor, but must be allocated in the best interest of completing the Work within the Time for Completion or the Contract Completion Date. Extensions to the Time for Completion or the Contract Completion Date, when granted by Change Order, will be granted only when equitable time adjustment exceeds the Total Float in the activity or path of activities affected by the change. On contracts with a price over \$5,000,000, the CPM schedule shall also show what part of the Contract Price (expressed in U.S. dollars) is attributable to each activity on the schedule, the sum of which for all activities shall equal the total Contract Price. On contracts with a price over \$10,000,000, the CPM schedule shall also show the planned workforce (crew size and number of crews) and the major pieces of equipment required for each activity on the schedule. When acceptable to the Owner and Architect/Engineer as to compliance with the requirements of this Section, the schedule shall become the CPM schedule for the Project. Acceptance of the schedule by the Owner does not indicate agreement with nor responsibility for the proposed or actual duration of any activity or logic shown on the accepted schedule.

- (d) **Monthly Project Reports:** The Contractor shall review progress not less than each month, but as often as necessary to properly manage the Project and stay on schedule. The Contractor shall collect and preserve information on Change Orders, including extensions of time. The Contractor shall evaluate this information and update the latest accepted schedule as often as necessary to finish within the Contract Time for Completion or before the Contract Completion Date. The Contractor shall submit to the A/E along with his monthly request for payment a copy of the bar graph schedule annotated to show the current progress. For projects requiring a CPM schedule, the Contractor shall submit a monthly report of the status of all activities. The bar graph schedule or monthly status report submitted with each periodic request for payment shall show the Work completed to date in comparison with the Work scheduled for completion, including but not limited to the dates for the beginning and completion of the placing of orders; the manufacture, testing and installation of materials, supplies and equipment. The form shall be approved by the A/E and the Owner; however, a bar graph or a CPM schedule marked, colored or annotated to reflect the above will usually satisfy this requirement. If any elements of the Work are behind schedule, regardless of whether they may prevent the Work from being completed on time, the Contractor must indicate in writing in the report what measures he is taking and plans to take to bring each such element back on schedule and to ensure that the Time for Completion or Contract Completion Date is not exceeded.
- (e) **Progress Delay:** Should any of the following conditions exist, the Owner may require the Contractor to prepare, at no extra cost to the Owner, a plan of action and a recovery schedule for completing the Work by the Contract Time for Completion or the Contract Completion Date:
 - (1) The Contractor's monthly project report indicates delays that are, in the opinion of the A/E or the Owner, of sufficient magnitude that the Contractor's ability to complete the Work by the scheduled Time for Completion or the Contract Completion Date is brought into question;
 - (2) The CPM schedule sorted by early finish shows the Contractor to be thirty (30) or more days behind the critical path schedule at any time during construction up to thirty (30) days prior to scheduled Substantial Completion date;
 - (3) The Contractor desires to make changes in the logic (sequencing of Work) or the planned duration of future activities of the CPM schedule which, in the opinion of the Architect/Engineer or the Owner, are of a major nature.

The plan of action and recovery schedule, when required, shall explain and display how the Contractor intends to regain compliance with the current accepted, fully completed, Project CPM schedule, as updated by approved change orders.

The plan of action, when required, shall be submitted to the Owner for review within two (2) business days of the Contractor receiving the Owner's written demand. The recovery schedule, when required, shall be submitted to the Owner within five (5) calendar days of the Contractor's receiving the Owner's written demand.

- (f) **Early Completion of Project:** The Contractor may attempt to achieve Substantial Completion on or before the Time for Completion or the Contract Completion Date. However, such planned early completion shall be for the Contractor's convenience only and shall not create any additional rights of the Contractor or obligations of the Owner under this Contract, nor shall it change the Time for Completion or the Contract Completion Date. The Contractor shall not be required to pay damages to the Owner because of its failure to achieve Substantial Completion by its planned earlier date. Likewise, the Owner shall not pay the Contractor any additional compensation for achieving Substantial Completion early nor will the Owner owe the Contractor any compensation should the Owner, its officers, employees, or agents cause the Contractor not to achieve Substantial Completion earlier than the date required by the Contract Documents.

If the Contractor seeks to change the Time for Completion or the Contract Completion Date to reflect an earlier completion date, he may request or propose such a change. The Owner may, but is not required to, accept such proposal. However, a change in the Time for Completion or the Contract Completion Date shall be accomplished only by Change Order. If the Contractor's proposal to change the Time for Completion or the Contract Completion Date is accepted, a Change Order will be issued stating that all references in the Contract, including these General Conditions, to the Time for Completion or the Contract Completion Date shall thereafter refer to the date as modified, and all rights and obligations, including the Contractor's liability for actual damages, delay damages and/or liquidated damages, shall be determined in relation to the date, as modified.

20. SCHEDULE OF VALUES AND CERTIFICATE FOR PAYMENT

- (a) Before submittal of the first partial payment request under the Contract, the Contractor shall prepare for review and approval of the Architect/Engineer and the Owner, a schedule of the estimated values listed by trades or by specification sections of the Work, totaling the Contract Price. Where the total project has multiple parts or phases, the Contractor shall prepare appropriate schedules of values to facilitate reviews and justifications for payments.

All requests for payment shall be made on the Schedule of Values and Certificate for Payment (Form CO-12) pages 1 and 2. Succeeding pages may be on the Form CO-12 continuation sheets or a computerized spreadsheet which is in the same format and which contains the same information. Where a computerized spreadsheet is used, one copy of the entire Schedule of Values shall be provided to the Owner in an agreed electronic format (e.g. LOTUS, EXCEL, or QUATTRO PRO) with the initial request for payment.

- (b) If the Contractor requests, or intends to request, payment for materials stored in an approved and secure manner, the Schedule of Values must indicate the amount for labor and the amount for materials, and in a supplement thereto must include an itemized list of materials for that trade or Work section. The material breakdown shall be in sufficient detail to allow verification of the quantities required for the Project, the quantities delivered, the Work completed, and the quantities stored on or off Site.
- (c) The "Value of Work Completed" portion of the Form CO-12 shall be completed, the Contractor's certification completed and signed, and the appropriate substantiating material attached to each Certificate for Payment (CO-12). Such substantiating material includes, but is not limited to, invoices for materials, delivery tickets, time sheets, payroll records, daily job logs/records, and similar materials which, in the opinion of the Owner and the A/E, are necessary or sufficient to justify payment of the amount requested.

- (d) The labor progress for any task or activity shall be calculated based upon the percentage of Work complete up to fifty percent (50%) of the completion of the task or activity. Thereafter, the evaluation of labor progress will be based upon the effort required to complete that task or activity. The material progress shall be calculated as the invoiced dollar cost of materials used in relationship to the amount estimated as necessary to complete a particular element of Work. When calculating material progress, credit shall be given for installed material as well as that stored on the Site and any material stored off Site which has been certified by the Architect/Engineer in accordance with Section 36 of these General Conditions.
- (e) Should Work included in previous Form CO-12 submittals, and for which payment has been made, subsequently be identified, by tests, inspection, or other means, as not acceptable or not conforming to Contract requirements, the "Value of Work Completed" portion of the first Form CO-12 submitted after such identification shall be modified to reduce the "completed" value of that Work by deleting the value of that which has been identified as not acceptable or nonconforming.

21. ACCESS TO WORK

The Architect/Engineer, the Owner, the Project Manager, the Owner's inspectors and other testing personnel, inspectors from the Department of Labor and Industry, and others authorized by the Owner, shall have access to the Work at all times. The Contractor shall provide proper facilities for access and inspection.

22. SURVEYS AND LAYOUT

- (a) The Owner shall furnish the Contractor all necessary documents showing property lines and the location of existing buildings and improvements. The Contractor shall provide competent surveying and engineering services to execute the Work in accordance with the Contract and shall be responsible for the accuracy of these surveying and engineering services.
- (b) Such general reference points and benchmarks on the Site as will enable the Contractor to proceed with the Work will be established in the plans and specifications. If the Contractor finds that any previously established reference points have been lost or destroyed, he shall promptly notify the Architect/Engineer.
- (c) The Contractor shall protect and preserve the established benchmarks and monuments and shall make no changes in locations without written notice to the Architect/Engineer and the written approval from the Owner. Any of these which may be lost or destroyed or which require shifting because of necessary changes in grades or locations shall, subject to prior written approval of the Owner, be replaced and accurately located by the Contractor.

23. PLANS AND SPECIFICATIONS

- (a) The general character and scope of the Work are illustrated by the plans and the specifications. If the Contractor deems additional detail or information to be needed, he may request the same in writing from the Architect/Engineer. His request shall precisely state the detail or information needed and shall explain why it is needed. The Contractor shall also indicate a date when the requested information is required. The Architect/Engineer shall provide by Field Order such further detail and information as is necessary by the date required so long as the date indicated is reasonable. Any additional drawings and instructions supplied to the Contractor shall be consistent with the Contract Documents, shall be true developments thereof, and shall be so prepared that they

can be reasonably interpreted as a part thereof. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

- (b) If a Subcontractor finds a conflict, error, or other discrepancy in the plans or specifications, he shall notify the Contractor in writing as soon as possible, but before proceeding with the affected Work. The Architect/Engineer shall issue a clarification by Field Order to the Contractor stating the correct requirements. If the Contractor deems the Field Order requires additional Work, he shall notify the A/E of such prior to proceeding with that Work and he shall submit a request for Change Order along with a detailed substantiating cost proposal to the Contractor within ten (10) calendar days. The Contractor shall evaluate the Subcontractor's request for change order in his capacity as Construction Manager and resolve the request.
- (c) In case of differences between small and large scale drawings, the large scale drawings shall govern. Where on any of the drawings a portion of the Work is drawn out and the remainder is indicated in outline, the parts drawn out shall apply also to all other like portions of the Work.
- (d) Where the word "similar" appears on the drawings, it shall be interpreted in its general sense and not as meaning identical, and all details shall be worked out in relation to their location and their connection with other parts of the Work.
- (e) The specifications are divided into several parts, or sections, for convenience only, since the entire specifications must be considered as a whole. The divisions of the specifications are not intended to control the Contractor in dividing the Work among Subcontractors or to limit the Work performed by any trade. The Contractor shall be solely responsible for the coordination of the trades, Subcontractors and vendors engaged in the Work and for the compensation of the trades, subcontractors and vendors for the Work performed.
- (f) Measurements or dimensions shown on the drawings for Site features, utilities and structures shall be verified at the Site by the Contractor. The Contractor shall not scale measurements or dimensions from the drawings. If there are discrepancies, the Architect/Engineer shall be consulted. If new Work is to connect to, match with or be provided in existing Work or the existing improvement, the Contractor shall verify the actual existing conditions and necessary dimensions prior to ordering or fabrication.
- (g) As-Built Drawings: The Contractor shall maintain at the Site for the Owner one copy of all drawings, specifications, addenda, approved shop or setting drawings, Change Orders and other modifications (collectively referred to herein as "As-Built Drawings") in good order and marked to record all changes as they occur during construction. These shall be available to the Architect/Engineer, the Owner, the Project Inspector, the Owner's other inspectors and to the Owner's testing personnel. The drawings shall be neatly and clearly marked in color during construction to record all variations made during construction. The representation of such variations shall include such supplementary notes, symbols, legends, and details as may be necessary to clearly show the as-built construction.
- (h) Record Drawings: Upon completion of the Work and prior to the final inspection, the Contractor shall deliver to the Architect/Engineer, for preparation of the Record Drawings, one complete set of "As-Built Drawings" referred to in the preceding subsection.
- (i) Documents for Demolition and Building Permits: If the Owner, A/E and Contractor propose to begin demolition and/or construction prior to completion of the complete construction documents for the Project, the following generally describes the scenario, procedure, submittals, and approvals required to obtain the demolition and building permits for the Project:
 - (a) Preliminary Design for a whole building shall be submitted to and found acceptable by the Owner / Agency and AARB. Submit to DEB/BCOM Review for general Code and DEB Standards compliance.

- (b) Site Plans shall be submitted to Department of Conservation and Recreation for Erosion Control and Stormwater Management approval / permitting. Upon approval from DCR and AARB, submit 2 copies of the sealed, signed and dated Site Plan, Erosion Control and Stormwater Management documents along with a listing of the applicable drawings to DEB/BCOM with the CO-17A to apply for the Site Work Permit
- (c) After approval / acceptance of the Preliminary Design, Working Drawings / completed designs with the seals and dated signatures of the A/E designer can be submitted to BCOM with a CO-17A Building Permit Application with a **List of Drawings in that Package** for the following "Packages" of work:
 - Foundations
 - Structure
 - Building Shell / Envelope
 - Complete Building Documents
- (d) When the documents in the "Package" are acceptable for construction, the Building Permit (with a listing of the drawings sheets with revision number and date) for that work can be issued. Building Permits for packages shall be cumulative such that the permit for the Complete Building Documents shall supersede all previous permits. Submit sufficient copies of the plans and specifications for that work so that when the Building Permit is issued, copies of the approved plans and specifications can be stamped "Approved" and copies returned with the Building Permit to be kept at the Construction Site trailer for use by any and all inspectors.
- (e) Follow similar procedures for the Building Shell including rated assemblies / partitions, shafts, stairwells, electric service, panels, and risers; plumbing risers and fixtures; HVAC equipment and main ducts; sprinkler risers, floor valves, and mains; Communication service entrance, risers, and distribution boards; fire alarm and fire detection annunciator panels.
- (f) Follow similar procedures for the interior build out to include all remaining systems, (HVAC, electrical, partitions, sprinkler layouts, lighting, etc.)
- (g) Any revisions to these approved documents / revised sheets of drawings shall be submitted with another application to BCOM for "Approved Stamp" and Building Permit noting the approval of the revised or addenda or added sheets.

Note: The agency shall be responsible for assuring that the agency has written approval to award a Construction Contract for the Work, that the Contract price has been determined, that the CO-9CM has been duly executed and that all Bonds, Insurances, and other requirements have been fulfilled prior to allowing the work to begin.

24. SUBMITTALS

- (a) The Contractor shall submit a listing of all Submittals required by the Architect/Engineer or which the Contractor identifies as necessary, fixing the dates for the submission of shop or setting drawings, samples and product data. The listing shall be in a format acceptable to the Architect/Engineer. The Contractor shall identify all Submittals with the Owner's Project Code Number as required by Section 2(f).
- (b) Submittals shall be forwarded to the Architect/Engineer for approval if required by the specifications or if requested by the Architect/Engineer or the Owner. No part of the Work dealt with by a Submittal shall be fabricated by the Contractor, save at his own risk, until such approval has been given.

- (c) The Contractor shall furnish to the Architect/Engineer for approval the name of the manufacturer, the model number, and other identifying data and information respecting the performance, capacity, nature and rating of the machinery and mechanical and other equipment which the Contractor contemplates incorporating in the Work. When Submittals are required by this Contract for materials, the Contractor shall furnish full information concerning the material or articles which he contemplates incorporating in the Work. When required, samples shall be submitted for approval at the Contractor's expense, with all shipping charges prepaid. Machinery, equipment, material and articles installed or used without required approval shall be at the risk of subsequent rejection.
- (d) Unless otherwise indicated or required elsewhere in the specifications, shop drawings shall be submitted in the form of one reproducible tracing and three blue line or black line prints. Catalog cuts, product data and other non-reproducible literature, except certificates, shall be submitted in six (6) copies minimum, of which three (3) will be retained by the Architect/Engineer and the remainder will be returned to the Contractor.
- (e) Submittals shall be accompanied by a letter of transmittal which shall list the Project Code Number, the Submittals included, the specification section number applicable to each, and the date shown on each Submittal. Submittals shall be complete in every respect and bound in sets. Each Submittal shall be clearly marked to show each item, component and/or optional feature proposed to be incorporated into the Project. Cross reference to the plans or specifications as needed to identify the use for which the item or component is intended.
- (f) The Contractor shall check the Submittals for compliance with the requirements of the Contract Documents. The Contractor shall clearly note in writing any and all items which deviate from the requirements of the Contract Documents. Reasons for deviation shall be included with the Submittal. The Contractor shall be solely responsible for checking all dimensions and coordinating all materials and trades to ensure that the components or products proposed, individually or in combination, will fit in the space available and that they will be compatible with other components or products provided.
- (g) After checking each submittal, the Contractor shall stamp each sheet of the Submittal with the Contractor's review stamp. Data submitted in a bound volume or on one sheet printed on two sides, may be stamped on the front of the first sheet only. The Contractor's review stamp shall be worded as follows:

The equipment and material shown and marked in this submittal is that proposed to be incorporated into this Project, is in compliance with the Contract drawings and specifications unless otherwise shown in bold face type or lettering and listed on a page or pages headed "DEPARTURES FROM DRAWINGS AND SPECIFICATIONS", and can be installed in the allocated spaces.

Reviewed by _____ Date _____

The person signing the review stamp shall be the person designated in writing by the Contractor as having that authority. (A copy of such designation shall be forwarded to the A/E prior to or with the first Submittal.) The signature on the stamped review statement shall be handwritten in ink. Stamped signatures are not acceptable.

- (h) The Contractor shall forward all Submittals sufficiently in advance of construction requirements to allow reasonable time for checking, correcting, resubmitting and rechecking.
- (i) If a Submittal indicates a departure from the Contract requirements, the Architect/Engineer may reject the Submittal or, if he deems it to have merit, may recommend it to the Owner, who shall approve or reject it as the Owner, in its sole discretion, sees fit. The departure from the Contract

requirements shall be further authorized by a Change Order, if a reduction or increase in the Contract Price is appropriate.

- (j) The Architect/Engineer is responsible to the Owner, but not to the Contractor, to verify that the Submittals conform to the design concept and functional requirements of the plans and specifications, that the detailed design portrayed in shop drawings and proposed equipment and materials shown in Submittals are of the quality specified and will function properly, and that the Submittals comply with the Contract Documents.
- (k) The Work shall be in accordance with approved Submittals. Approval of the Contractor's Submittals by the A/E does not relieve the Contractor from responsibility of complying with the Contract and all drawings and specifications, except as changed by Change Order.
- (l) The plans and/or specifications may indicate that the Architect/Engineer designed or detailed a portion of the plans around a particular product (most commonly a piece of equipment). Should a different product be proposed by the Contractor and accepted, all modifications, rerouting, relocations and variations required for proper installation and coordination to comply with the design concept and requirements of the Contract Documents shall be the responsibility of the Contractor and shall be made at no extra cost to the Owner. If the plans were noted as designed or detailed around a particular product and/or if a product is named when a "brand name or equal" specification has been used, this is not intended to favor or preclude the use of other products pursuant to Section 26 of these General Conditions. Rather such design merely acknowledges the reality that in many instances the Architect/Engineer must have a basis to design and detail around for dimensions and characteristics of a product or system.
- (m) Additional Submittal requirements are shown in the specifications.

25. FEES, SERVICES AND FACILITIES

- (a) The Contractor shall obtain all permits, except the Building Permit, and pay for all fees and charges necessary for temporary access and public right-of-way blockage or use, for temporary connections to utilities and for the use of property (other than the Site) for storage of materials and other purposes unless otherwise specifically stated in the Contract Documents.
- (b) Certain projects such as renovations and interior modifications of existing buildings will usually have water and electric service to the building. In those instances, water and electric power, if required for the Work under the Contract, will be furnished by the Owner subject to reasonable use by the Contractor, only to the extent and capacity of present services. The Contractor shall be responsible for providing required connections, temporary wiring, piping, etc. to these services in a safe manner and in accordance with applicable codes. All temporary wire, pipe, etc. shall be removed before the Substantial Completion inspection. Acceptance by the Contractor of the use of Owner's water and electricity constitutes a release to the Owner of all claims and of all liability to the Contractor for whatever damages which may result from power and water outages or voltage variations.
- (c) The Owner shall pay any connection charges for permanent utility connections directly to the utility Supplier. The Contractor shall coordinate such connections with the utility Supplier.
- (d) It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor, either directly or through his Subcontractors, shall provide and pay for all material, labor, tools, equipment, water, light, power, telephone and other services or facilities of every nature whatsoever necessary to execute completely and deliver the Work within the Contract Time for Completion or before the Contract Completion Date.

- (e) The Contractor shall provide temporary facilities including Contractor's office space, Owner's Project Inspector office space (if required by the specifications), toilet facilities, and storage space, as required for the operations and the protection of the material and work. Number, sizes and locations shall be subject to approval of the Owner. Sanitary facilities shall be an approved type of chemical toilet and shall be regularly serviced.

26. **EQUALS/FUNCTIONAL EQUIVALENTS**

- (a) **Brand names:** Unless otherwise stated in the specifications, the name of a certain brand, make or manufacturer denotes the characteristics, quality, workmanship, economy of operation and suitability for the intended purpose of the article desired, but does not restrict the Contractor to the specific brand, make, or manufacturer; it is set forth to convey to the Contractor the general style, type, character and quality of the article specified.
- (b) **Equal materials, equipment or assemblies:** Whenever in these Contract Documents, a particular brand, make of material, device or equipment is shown or specified, such brand, make of material, device or equipment shall be regarded merely as a standard. Any other brand, make or manufacturer of a product, assembly or equipment which in the opinion of the Architect/Engineer is the equal of that specified, considering quality, capabilities, workmanship, configuration, economy of operation, useful life, compatibility with design of the Work, and suitability for the intended purpose, will be accepted unless rejected by the Owner as not being equal.
- (c) **Substitute materials, equipment or assemblies:** The Contractor may propose to substitute a material, product, equipment, or assembly which deviates from the requirements of the Contract Documents but which the Contractor deems will perform the same function and have equal capabilities, service life, economy of operations, and suitability for the intended purpose. The proposal must include any cost differentials proposed. The Owner will have the A/E provide an initial evaluation of such proposed substitutes and provide a recommendation on acceptability and indicate the A/E's redesign fee to incorporate the substitution in the design. If the proposed substitute is acceptable to the Owner, a Change Order will be proposed to the Contractor to accept the substitute and to deduct the cost of the A/E redesign fee and the proposed cost savings from the Contract Price. The Owner shall have the right to limit or reject substitutions at its sole discretion.
- (d) The Contractor shall be responsible for making all changes in the Work necessary to adapt and accommodate any equal or substitute product which it uses. The necessary changes shall be made at the Contractor's expense.

27. **AVAILABILITY OF MATERIALS**

If a brand name, product, or model number included in the Contract Documents is not available on the present market, alternate equal products or model numbers may be proposed by the Contractor through the Architect/Engineer for approval by the Owner.

28. **CONTRACTOR'S TITLE TO MATERIALS**

No materials or supplies for the Work shall be purchased by the Contractor, or by any Subcontractor or Supplier, subject to any security interest, installment or sales contract or any other agreement or lien by which an interest is retained by the seller or is given to a secured party. The Contractor warrants that he has clear and good title to all materials and supplies which he uses in the Work or for which he accepts payment in whole or in part.

29. STANDARDS FOR MATERIALS INSTALLATION & WORKMANSHIP

- (a) Unless otherwise specifically provided in the Contract, all equipment, material, and accessories incorporated in the Work are to be new and in first class condition.
- (b) Unless specifically approved by the Owner or required by the Contract, the Contractor shall not incorporate into the Work any materials containing asbestos or any material known by the industry to be hazardous to the health of building construction workers, maintenance workers, or occupants. If the Contractor becomes aware that a material required by the Contract contains asbestos or other hazardous materials, he shall notify the Owner and the Architect/Engineer immediately and shall take no further steps to acquire or install any such material without first obtaining Owner approval.
- (c) All workmanship shall be of the highest quality found in the building industry in every respect. All items of Work shall be done by craftsmen or tradesmen skilled in the particular task or activity to which they are assigned. In the acceptance or rejection of Work, no allowance will be made for lack of skill on the part of workmen. Poor or inferior workmanship (as determined by the Architect/Engineer, the Owner or other inspecting authorities) shall be removed and replaced at Contractor's expense such that the Work conforms to the highest quality standards of the trades concerned, or otherwise corrected to the satisfaction of the Architect/Engineer, the Owner, or other inspecting authority, as applicable.
- (d) Under the various sections of the plans or specifications, where specified items are supplied with the manufacturer's printed instructions, recommendations, or directions for installation, or where such instructions, recommendations, or directions are available, installation of the specified items shall be in strict accordance with the manufacturer's printed instructions unless those instructions contradict the plans or specifications, in which case the Architect/Engineer will be notified for an interpretation and decision.
- (e) Under the various sections of the plans or specifications, where reference is made to specific codes or standards governing the installation of specified items, installation shall in all cases be in strict accordance with the referenced codes and standards. Where no reference is made to specific codes or standards, installation shall conform to the generally recognized applicable standards for first-class installation of the specific item to be installed. Contractors are expected to be proficient and skilled in their respective trades and knowledgeable of the Codes and Standards of the National Fire Protection Association (NFPA), National Electric Code (NEC), Occupational Safety and Health Act (OSHA) and other codes and standards applicable to installations and associated work by his trade.
- (f) Where the manufacturer's printed instructions are not available for installation of specific items, where specific codes or standards are not referenced to govern the installation or specific items, or where there is uncertainty on the part of the Contractor concerning the installation procedures to be followed or the quality of workmanship to be maintained in the installation of specific items, the Contractor shall consult the Architect/Engineer for approval of the installation procedures or the specific standards governing the quality of workmanship the Contractor proposes to follow or maintain during the installation of the items in question.
- (g) During and/or at the completion of installation of any items, the tests designated in the plans or specifications necessary to assure proper and satisfactory functioning for its intended purpose shall be performed by the Contractor or by its Subcontractor responsible for the completed installation. All costs for such testing are to be included in the Contract Price. If required by the Contract Documents, the Contractor shall furnish prior to final inspection the manufacturers' certificates evidencing that products meet or exceed applicable performance, warranty and other requirements, and certificates that products have been properly installed and tested.

30. WARRANTY OF MATERIALS AND WORKMANSHIP

- (a) The Contractor warrants that, unless otherwise specified, all materials and equipment incorporated in the Work under the Contract shall be new, in first class condition, and in accordance with the Contract Documents. The Contractor further warrants that all workmanship shall be of the highest quality and in accordance with the Contract Documents and shall be performed by persons qualified at their respective trades.
- (b) Work not conforming to these warranties shall be considered defective.
- (c) This warranty of materials and workmanship is separate and independent from and in addition to any of the Contractor's other guarantees or obligations in the Contract or under Virginia law.

31. USE OF SITE AND REMOVAL OF DEBRIS

- (a) The Contractor shall:
 - (1) Perform the Work in such a manner as not to interrupt or interfere with the operation of any existing activity on, or in proximity to, the Site or with the Work of any other separate contractor;
 - (2) Store his apparatus, materials, supplies and equipment in such orderly fashion at the Site of the Work as will not unduly interfere with the progress of his Work or the work of any other separate contractor; and
 - (3) Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
- (b) The Contractor expressly undertakes, either directly or through his Subcontractor(s), to effect all cutting, filling or patching of the Work required to make the same conform to the plans and specifications, and, except with the consent of the Architect/Engineer, not to cut or otherwise alter the Work of any other separate contractor. The Contractor shall not damage or endanger any portion of the Work or Site, including existing improvements, unless called for by the Contract.
- (c) The Contractor expressly undertakes, either directly or through his Subcontractor(s), to clean up frequently all refuse, rubbish, scrap materials and debris caused by his operations, to the end that at all times the Site shall present a neat, orderly and workmanlike appearance. No such refuse, rubbish, scrap material and debris shall be left within the completed Work nor buried on the building Site, but shall be removed from the Site and properly disposed of in a licensed landfill or otherwise as required by law.
- (d) The Contractor expressly undertakes, either directly or through his Subcontractor(s), before final payment or such prior time as the Owner may require, to remove all surplus material, false Work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from his operations and to put the Site in a neat, orderly condition; to thoroughly clean and leave reasonably dust free all finished surfaces including all equipment, piping, etc., on the interior of all buildings included in the Contract; and to clean thoroughly all glass installed under the Contract, including the removal of all paint and mortar splatters and other defacements. If the Contractor fails to clean up at the time required herein, the Owner may do so and charge the costs incurred thereby to the Contractor in accordance with Section 10 (b) of these General Conditions.
- (e) The Contractor shall have, On-Site, an employee certified by the Department of Conservation and Recreation as a Responsible Land Disturber who shall be responsible for the installation, inspection and maintenance of erosion control and stormwater management measures and devices. The Contractor shall prevent Site soil erosion, the runoff of silt and/or debris carrying water from the

Site, and the blowing of debris off the Site in accordance with the applicable requirements and standards of the Contract and the Virginia Department of Conservation and Recreation's Erosion and Sediment Control Regulations and the Virginia Stormwater Management Regulations.

32. TEMPORARY ROADS

Temporary roads, if required, shall be established and maintained until permanent roads are accepted, then removed and the area restored to the conditions required by the Contract Documents. Crushed rock, paving and other road materials from temporary roads shall not be left on the Site unless permission is received from the Owner to bury the same at a location and depth approved by the Owner.

33. SIGNS

The Contractor may, at his option and without cost to the Owner, erect signs acceptable to the Owner on the Site for the purpose of identifying and giving directions to the job. No signs shall be erected without prior approval of the Owner as to design and location.

34. PROTECTION OF PERSONS AND PROPERTY

- (a) The Contractor expressly undertakes both directly and through his Subcontractors, to take every reasonable precaution at all times for the protection of all persons and property which may come on the Site or be affected by the Contractor's Work.
- (b) The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Any violation of these requirements or duties or any potential safety hazard that is brought to the attention of the Contractor by the Architect/Engineer, the Owner, or any other persons shall be immediately abated.
- (c) The provisions of all rules and regulations governing health and safety as adopted by the Safety Codes Commission of the Commonwealth of Virginia, issued by the Department of Labor and Industry under Title 40.1 of the Code of Virginia, shall apply to all Work under this Contract.
- (d) The Contractor shall continuously maintain adequate protection of all his Work from damage and shall protect the Owner's property from injury or loss arising in connection with this Contract. He shall make good any such damage, injury or loss, except as may be directly and solely due to errors in the Contract Documents or caused by agents or employees of the Owner. The Contractor shall adequately protect adjacent property to prevent any damage to it or loss of use and enjoyment by its owners. The Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for protection as required by public authority, local conditions, or the Contract.
- (e) In an emergency affecting the health, safety or life of persons or of the Work, or of the adjoining property, the Contractor, without special instruction or authorization from the Architect/Engineer or the Owner, shall act, at his discretion, to prevent such threatened loss or injury. Also, should he, to prevent threatened loss or injury, be instructed or authorized to act by the Architect/Engineer or the Owner, he shall so act immediately, without appeal. Any additional compensation or extension of time claimed by the Contractor on account of any emergency work shall be determined as provided by Section 38 of these General Conditions.
- (f) When necessary for the proper protection of the Work, temporary heating of a type approved by the Architect/Engineer must be provided by the Contractor, at the Contractor's expense, unless otherwise specified.

35. CLIMATIC CONDITIONS

The Contractor shall suspend activity on and protect any portion of the Work that may be subject to damage by climatic conditions.

36. PAYMENTS TO CONTRACTOR

- (a) Unless otherwise provided in the Contract, the Owner will make partial payments to the Contractor on the basis of a duly certified and approved Schedule of Values and Certificate for Payment, Form CO-12, showing the estimate of the Work performed during the preceding calendar month or work period, as recommended by the Architect/Engineer. When evaluating the Contractor's Form CO-12, the Architect/Engineer will consider the value of the Work in place, the value of approved and properly stored materials, the status of the Work on the critical path with regard to the Time for Completion, and the estimated value of the Work necessary to achieve Final Completion. The Architect/Engineer will schedule a monthly pay meeting to occur no earlier than the 25th day of the month represented by the payment request or not later than the 5th day of the following month. The Contractor will submit his monthly estimate of Work completed on Form CO-12 so that it is received by the Architect/Engineer and the Owner's Project Manager at least one work day prior to the date scheduled by the Architect/Engineer for the monthly pay meeting. The Owner will review the estimate with the Architect/Engineer and the Contractor at the monthly pay meeting, which shall be considered the receipt date, and may approve any or all of the estimate of Work for payment. In preparing estimates, the material delivered to the Site and preparatory Work done shall be taken into consideration, if properly documented as required by Section 20 of these General Conditions, or as may be required by the Architect/Engineer so that quantities may be verified. In addition to material delivered to the Site, material such as large pieces of equipment and items purchased specifically for the Project, but stored off the Site within the Commonwealth of Virginia, may be considered for payment, provided all of the following are accomplished prior to the submission of the monthly payment request in which payment for such materials is requested:
- (1) The Contractor must notify the Owner in writing, at least ten (10) days prior to the submission of the payment request, through the Architect/Engineer, that specific items will be stored off Site in a designated, secured place within the Commonwealth of Virginia. The Schedule of Values must be detailed to indicate separately both the value of the material and the labor/installation for trades requesting payment for stored materials. By giving such notification and by requesting payment for material stored off Site, the Contractor warrants that the storage location is safe and suitable for the type of material stored and that the materials are identified as being the property of the Contractor, and agrees that loss of materials stored off the Site shall not relieve the Contractor of the obligation to timely furnish these types and quantities of materials for the Project and meet the Time for Completion or Contract Completion Date, subject to Section 43 (b) of these General Conditions. If the storage location is more than 20 miles from the Site, the Contractor may be required to reimburse the Owner for the cost incurred for travel to the storage location to verify the Contractor's request for payment for materials stored off Site.
- (2) Such notification, as well as the payment request, shall:
- (a) Itemize the quantity of such materials and document with invoices showing the cost of said materials;
- (b) Indicate the identification markings used on the materials, which shall clearly reference the materials to the particular project;
- (c) Identify the specific location of the materials, which must be within reasonable proximity to the Site and within the Commonwealth of Virginia;
- (d) Include a letter from the Contractor's Surety which confirms that the Surety on the Performance Bond and the Labor and Material Payment Bond has been notified of the request for payment of materials stored off the Site and agrees that the materials are covered by the bond; and

- (e) Include a certificate of all-risk builder's risk insurance in an amount not less than the fair market value of the materials, which shall name the Owner and the Contractor as co-insured.
 - (3) The Architect/Engineer shall indicate, in writing, to the Owner that Submittals for such materials have been reviewed and meet the requirements of the Contract Documents, that the stored materials meet the requirement of the plans and specifications, and that such materials conform to the approved Submittals. Should the A/E deem it necessary to visit the storage site to make such review, the Contractor shall bear the costs incurred therewith.
 - (4) The Owner, through the Architect/Engineer, shall notify the Contractor in writing of its agreement to prepayment for such materials.
 - (5) The Contractor shall notify the Owner in writing, through the Architect/Engineer, when the materials are to be transferred to the Site and when the materials are received at the Site.
- (b) Payment will not be made for materials or equipment stored on or off the Site which are not scheduled for incorporation into the Work within the six months next following submission of the request for payment, unless the Contractor has the prior consent of the Owner, which consent may be granted or withheld by the Owner in its discretion if, in the opinion of the Owner, it is not necessary to procure the materials more than six months in advance of use to assure their availability when needed.
 - (c) No payment shall be made to the Contractor until the Contractor furnishes to the Owner its Social Security Number (SSN) if an individual, or its Federal Employer Identification Number (FEIN) if a proprietorship, partnership, corporation or other legal entity. No payment shall be made to the Contractor until Certificates of Insurance or other satisfactory evidence of compliance by the Contractor with all the requirements of Section 11 (and Section 12 if applicable) of these General Conditions have been delivered to the Owner. Further, no payments on the basis of Work performed by a Subcontractor shall be paid by the Owner until copies of any certificates of insurance required of the Subcontractor under Section 11 have been delivered to the Owner.
 - (d) In making such partial payments, five percent (5%) of each payment to the Contractor shall be retained until Final Completion and acceptance of all Work covered by the Contract, unless otherwise provided by any law, regulation or program of the federal government. Such retainage shall be held to assure faithful performance of the Contract and may also be used as a fund to deduct amounts due to or claimed by the Owner, including, but not limited to, payment to the Owner of all moneys due for deductive change orders, credits, uncorrected Defective Work, interest, damages, and the like. (§2.2-4333 of the Code of Virginia) The Owner may, at its sole discretion, agree on an item by item basis to release the retainage on items which are fully 100% complete and which have accepted by the Owner as being tested and complete and on which no further action or work will be required. Retainage which is released by the Owner shall be distributed by the Contractor in conformance with Section 37 of these General Conditions.
 - (e) All material and Work for which partial payments are made shall thereupon become the sole property of the Owner, but this provision shall not relieve the Contractor from the sole responsibility for all materials and Work, including those for which payment has been made, or for the restoration of any damaged materials or Work. Nor shall this provision serve as a waiver of the right of the Owner to require the fulfillment of all of the terms and conditions of the Contract.
 - (f) The final payment, which shall include the retainage, less any amounts due to or claimed by the Owner, shall not become due until the Architect/Engineer and the Owner agree that Final Completion has been achieved and until the Contractor shall deliver to the Owner through the

Architect/Engineer a Certificate of Completion by the Contractor (Form CO-13.2) and an Affidavit of Payment of Claims (Form CO-13), stating that all Subcontractors and Suppliers of either labor or materials have been paid all sums claimed by them for Work performed or materials furnished in connection with this Project less retainage. Amounts due the Owner which may be withheld from the final payment may include, but are not limited to, amounts due pursuant to Section 3(i), Section 16(a)-(d), Section 31(d), costs incurred to repair or replace Defective Work, costs incurred as a result of the Contractor's negligent acts or omissions or omissions of those for whom the Contractor is responsible, delay damages under Section 43(h), and any liquidated or actual damages. If all Subcontractors and Suppliers of labor and materials have not been paid the full amount claimed by them, the Contractor shall list each to which an agreed amount of money is due or which has a claim in dispute. With respect to all such Subcontractors and Suppliers, the Contractor shall provide to the Owner, along with the Affidavit of Payment of Claims (Form CO-13), an affidavit from each such Subcontractor and Supplier stating the amount of their subcontract or supply contract, the percentage of completion, the amounts paid to them by the Contractor and the dates of payment, the amount of money still due if any, any interest due the Subcontractor or Supplier pursuant to Section 37(b) below, and whether satisfactory arrangements have been made for the payment of said amounts. If no agreement can be reached between the Contractor and one or more Subcontractors or Suppliers as to the amounts owed to the Subcontractors or Suppliers, the Owner may, in its discretion, pay such portion of the moneys due to the Contractor which is claimed by the Subcontractor or Supplier into a Virginia Court or Federal Court sitting in Virginia, in the manner provided by law. Said payment into court shall be deemed a payment to the Contractor. Nothing in this Section shall be construed as creating any obligation or contractual relationship between the Owner and any Subcontractor or Supplier, and the Owner shall not be liable to any Subcontractor or Supplier on account of any failure or delay of the Owner in complying with the terms hereof.

- (g) Upon successful completion of the final inspection and all Work required by the Contract, including but not limited to the delivery of As-Built drawings, equipment manuals, written warranties, acceptance of the Work by the Owner and the delivery of the affidavits required in Section 36(f) of these General Conditions, the Architect/Engineer shall deliver the written Certificate of Completion by the Architect/Engineer (Form CO-13.1) to the Owner, with a copy to the Contractor, stating the entire amount of Work performed and compensation earned by the Contractor, including extra work and compensation therefor. The Owner may accept the Work for occupancy or use while asserting claims against the Contractor; disputing the amount of compensation due to the Contractor; disputing the quality of the Work, its completion, or its compliance with the Contract Documents; or any other reason.
- (h) Unless there is a dispute about the compensation due to the Contractor, Defective Work, quality of the Work, compliance with the Contract Documents, completion itself, claims by the Owner, other matters in contention between the parties, or unless monies are withheld pursuant to the Comptroller's Debt Setoff Program, within thirty (30) days after receipt and acceptance of the Schedule of Values and Certificate for Payment (Form CO-12) in proper form by the Architect/Engineer at the monthly pay meeting, which shall be considered the receipt date, the Owner shall pay to the Contractor the amount approved by the Architect/Engineer, less all prior payments and advances whatsoever to or for the account of the Contractor. In the case of final payment, the completed Affidavit of Payment of Claims (Form CO-13), the Certificate of Completion by the Contractor (Form CO-13.2) and the Certificate of Completion by the Architect/Engineer (Form CO-13.1) shall accompany the final Schedule of Values and Certificate for Payment (Form CO-12) which is forwarded to the Owner for payment. The date on which payment is due shall be referred to as the Payment Date. In the event of disputes, payment shall be mailed on or before the Payment Date for amounts and Work not in dispute, subject to any set offs claimed by the Owner; provided, however in instances where further appropriations are required by the General Assembly or where the issuance of further bonds is required, in which case, payment shall be made within thirty (30) days after the effective date of such appropriation or within thirty (30) days after the receipt of bond proceeds by the Owner. All prior estimates and payments including those relating to extra Work may be corrected and adjusted in any payment and shall be

corrected and adjusted in the final payment. In the event that any request for payment (CO-12) by the Contractor contains a defect or impropriety, the Owner shall notify the Contractor of any defect or impropriety which would prevent payment by the Payment Date, within five (5) days after receipt of the Schedule of Values and Certificate for Payment (Form CO-12) by the Owner from the Architect/Engineer.

- (i) Interest shall accrue on all amounts owed by the Owner to the Contractor which remain unpaid seven (7) days following the Payment Date. Said interest shall accrue at the discounted ninety-day U.S. Treasury bill rate as established by the Weekly Auction and as reported in the publication entitled The Wall Street Journal on the weekday following each such Weekly Auction. During the period of time when the amounts due to the Contractor remain unpaid following the seventh (7) day after the Payment Date, the interest accruing shall fluctuate on a weekly basis and shall be that established by the immediately prior Weekly Auction. It shall be the responsibility of the Contractor to gather and substantiate the applicable weekly interest rates to the satisfaction of the Owner and to calculate to the satisfaction of the Owner the interest due. In no event shall the rate of interest charge exceed the rate of interest charged pursuant to §58.1-1812 of the Code of Virginia. No interest shall accrue on retainage or when payment is delayed because of disagreement between the Owner and the Contractor regarding the quantity, quality or timeliness of the Work, including, but not limited to, compliance with Contract Documents or the accuracy of any Request for Payment received. This exception to the accrual of interest stated in the preceding sentence shall apply only to that portion of a delayed payment which is actually the subject of such a disagreement and shall apply only for the duration of such disagreement. Nothing contained herein shall be interpreted, however, to prevent the withholding of retainage to assure faithful performance of the Contract. These same provisions relating to payment of interest to the Contractor shall apply also to the computation and accrual of interest on any amounts due from the Contractor to the Owner for deductive change orders and to amounts due on any claims by the Owner. The date of mailing of any payment by the U.S. Mail is deemed to be the date of payment to the addressee.
- (j) The acceptance by the Contractor of the final payment shall be and operate as a release to the Owner of all claims by the Contractor, its Subcontractors and Suppliers, and of all liability to the Contractor whatever, including liability for all things done or furnished in connection with this Work, except for things done or furnished which are the subject of unresolved claims for which the Contractor has filed a timely written notice of intent, provided a claim is submitted no later than sixty (60) days after final payment. Acceptance of any interest payment by the Contractor shall be a release of the Owner from claims by the Contractor for late payment.
- (k) No certificate for payment issued by the Architect/Engineer, and no payment, final or otherwise, no certificate of completion, nor partial or entire use or occupancy of the Work by the Owner, shall be an acceptance of any Work or materials not in accordance with the Contract, nor shall the same relieve the Contractor of responsibility for faulty materials or Defective Work or operate to release the Contractor or his Surety from any obligation under the Contract, the Standard Performance Bond and the Standard Labor and Material Payment Bond.

37. PAYMENTS BY CONTRACTOR (§2.2-4354, Code of Virginia)

Under §2.2-4354, Code of Virginia, the Contractor is obligated to:

- (a) Within seven (7) days after receipt of amounts paid to the Contractor by the Owner for Work performed by the Subcontractor or Supplier under this Contract,
 - (1) Pay the Subcontractor or Supplier for the proportionate share of the total payment received from the Owner attributable to the Work performed by the Subcontractor or the materials furnished by the Supplier under this Contract; or

- (2) Notify the Subcontractor or Supplier, in writing, of his intention to withhold all or a part of the Subcontractor or Supplier's payment with the reason for nonpayment;
- (b) Pay interest to the Subcontractor or Supplier on all amounts owed by the Contractor that remain unpaid after seven (7) days following receipt by the Contractor of payment from the Owner for Work performed by the Subcontractor or materials furnished by the Supplier under this contract, except for amounts withheld as allowed under subsection (a) (2) of this Section.
- (c) Include in each of his subcontracts a provision requiring each Subcontractor to include in each of its subcontracts a provision requiring each subcontractor to include or otherwise be subject to the same payment and interest requirements with respect to each lower tier subcontractor. Each Subcontractor shall include with its invoice to, or request for payment from, the Contractor, a certification that that Subcontractor has paid each of its suppliers and lower tier subcontractors their proportionate share of previous payments received from the Contractor attributable to the Work performed or the materials furnished by it under this Contract.

The Contractor's obligation to pay interest to the Subcontractor or Supplier pursuant to subsection (b) of this Section is not an obligation of the Owner. A modification to this Contract shall not be made for the purpose of providing reimbursement for such interest charge. A Contractor's cost reimbursement claim shall not include any amount for reimbursement of such interest charge.

38. CHANGES IN THE WORK

- (a) The Owner may at any time, by written order utilizing the Commonwealth of Virginia Change Order Form CO-11 and without notice to the sureties, make changes in the Work which are within the general scope of the Contract, except that no change will be made which will increase the total Contract Price to an amount more than twenty percent (20%) in excess of the original Contract Price without notice to sureties. At the time of the Preconstruction Meeting described in Section 50(b), the Contractor and the Owner shall advise each other in writing of their designees authorized to accept and/or approve changes to the Contract Price and of any limits to each designee's authority. Should any designee or limits of authority change during the time this Contract is in effect, the Contractor or Owner shall give written notice to the other within seven (7) calendar days, utilizing the procedures set forth in these General Conditions. The Contractor agrees and understands that the authority of the Owner's designee is limited by Virginia Code §2.2-4309 and any other applicable statute.

The Contractor has determined the GMP as defined. Where the subcontractor, supplier or vendor requests a change order to its contract with the Contractor, such request for Change Order shall be governed by the procedures and requirements of the General Conditions.

In making any change, the charge or credit for the change shall be determined by one of the following methods as selected by the Owner:

- (1) By a mutually agreed fixed amount change to the Contract Price and/or time allowed for completion of the Work. The Change Order shall be substantiated by documentation itemizing the estimated quantities and costs of all labor, materials and equipment required as well as any mark-up used. The price change shall include the Contractor's overhead and profit. See Subsections (d) and (e) below.
- (2) By using unit prices and calculating the number of net units of Work in each part of the Work which is changed, either as the Work progresses or before Work on the change commences, and by then multiplying the calculated number of units by the applicable unit price set forth in the Contract or multiplying by a mutually agreed unit price if none was provided in the Contract. No additional percentage markup for overhead or profit shall be added to the unit prices.

- (3) By ordering the Contractor, by Change Order or written notice citing this subsection, to proceed with the change to the Work; to keep in a form acceptable to the Owner, an accurate, itemized account of the cost of the change in the Work, including, but not limited to, the costs of labor, materials, equipment, and supplies; and to annotate a copy of the Project schedule to accurately show the status of the Work at the time this initial change order is issued, to show the start and finish of the changed Work, and the status of the Work when the changed Work is completed. A Change Order citing this subsection shall describe the parameters of the change in the Work, describe the cost items to be itemized and verified for payment, address the impact on the schedule for Substantial Completion, and state that a subsequent Change Order will be issued to incorporate the cost of the changed Work into the Contract Price and any change in the Contract Time for Completion or Contract Completion Date. The Contractor shall sign the Change Order acknowledging he has been directed to proceed with the changed Work. The Contractor's signature on each initial Change Order authorizing Work and citing this Subsection as the method for determining the cost of the Work shall not constitute the Contractor's agreement on the cost or time impact of the changed Work.

Except as otherwise may be agreed to in writing by the Owner, such costs shall not exceed those prevailing for the trades or crafts, materials, and equipment in the locality of the Project, may include only those items listed as allowable in Subsection 38(e), and shall not include any of the costs listed as not allowable in Subsection 38(f). The Owner shall be permitted, on a daily basis, to verify such records and may require such additional records as are necessary to determine the cost of the change to the Work.

Within fourteen (14) days of the conclusion of such ordered Work, the Contractor and the Owner shall arrive at a cost for the Change Order, based on the records kept and the Contractor's allowance for overhead and profit as set forth in Subsections (d), (e) and (f) below, and such costs shall be incorporated into a Change Order which references the Change Order ordering the Work. If agreement on the cost of the changed Work cannot be reached within the fourteen (14) days allotted, the Contractor may file a claim for the disputed amount as provided for in Section 47.

- (4) By issuing a unilateral change order in the amount deemed appropriate by the owner for the work. If the Contractor objects to the amount or scope of the change order then the Contractor may within the 14 days of the date of the change order file a claim for the disputed amount as provided for in section 47.
- (b) The Contractor shall review any Owner requested or directed change and shall respond in writing within fourteen (14) calendar days after receipt of the proposed change (or such other reasonable time as the Owner may direct), stating the effect of the proposed change upon his Work, including any increase or decrease in the Contract time and Price. The Contractor shall furnish to the Owner an itemized breakdown of the quantities and prices used in computing the proposed change in Contract Price.

The Owner shall review the Contractor's proposal and respond to the Contractor within thirty (30) days of receipt. If a change to the Contract Price and time for performance are agreed upon, both parties shall sign the Change Order. If the price and time are not agreed upon, the Owner may direct the Contractor to proceed under Subsection 38(a)(3). Changes to the Contract time and/or Price shall be effective when signed by both parties, unless approval by the Governor or his designee is required.

- (c) In figuring changes, any instructions for measurement of quantities set forth in the Contract shall be followed.
- (d) The percentage for overhead and profit to be used in calculating both additive and deductive changes in the Work (other than changes covered by unit prices) shall not exceed the percentages

for each category listed below. Said percentages for overhead and profit shall be applied only on the net cost of the changed Work (i.e. difference in cost between original and revised Work):

- (1) If a Subcontractor does all or part of the changed Work, the Subcontractor's markup for overhead and profit on the Work it performs shall be a maximum of fifteen percent (15%). The Contractor's mark-up on the subcontractor's price shall be a maximum of ten percent (10%) if the changes in the Work are ordered by the Owner where such Work was not included in the GMP. Change orders utilizing the CM Contingency issued by the Contractor to the Subcontractor for work shall not be marked up by the Contractor.
 - (2) If the Contractor does all or part of the changed Work ordered by the Owner for Work not included in the GMP, its markup for overhead and profit on the changed Work it performs shall be a maximum of fifteen percent (15%). For Work being performed by the Contractor under the provisions of the Contract allowing self-performance, there shall be no markup for overhead and profit for changes to the Work being self performed by the Contractor.
 - (3) If a Sub-subcontractor at any tier does all or part of the changed Work, the Sub-subcontractor's markup on that Work shall be a maximum of fifteen percent (15%). The markup of a sub-subcontractor's Work by the Contractor and all intervening tiers of Subcontractors shall not exceed a total of ten percent (10%) for Work ordered by the Owner where such Work was not included in the GMP. Change orders utilizing the CM Contingency issued by the Contractor to the Sub-subcontractor for work shall not be marked up by the Contractor or Subcontractor.
 - (4) Where Work is deleted from the Contract prior to commencement of that Work without substitution of other similar Work, one hundred percent (100%) of the Contract Price attributable to that Work shall be deducted from the Contract Price. However, in the event that material Submittals have been approved and orders placed for said materials, a lesser amount, but in no case less than eighty percent (80%) of the Contract Price attributable to that Work, shall be deducted from the Contract Price. The credit to the Owner for reduced premiums on labor and material bonds and performance bonds shall in all cases be one hundred percent (100%).
- (e) Allowable costs for changes in the Work may include but are not limited to the following:
- (1) Labor costs for employees directly employed in the change in the Work, including salaries and wages plus the cost of payroll charges and fringe benefits and overtime premiums, if such premiums are explicitly authorized by the Owner.
 - (2) Materials incorporated into the change to the Work, including costs of transportation and storage, if applicable. If applicable, all cash discounts shall accrue to the Contractor, unless the Owner deposits funds with the Contractor to make such payments, and all trade discounts, rebates, refunds, and returns from the sale of surplus materials shall accrue to the Owner.
 - (3) Equipment incorporated in the changed Work or equipment used directly in accomplishing the Work. If rented expressly for accomplishing the change in the Work, the cost shall be the rental rate according to the terms of the rental agreement, which the Owner shall have the right to approve. If owned by the Contractor, the costs shall be a reasonable price based upon the life expectancy of the equipment and the purchase price of the equipment. If applicable, transportation costs may be included.
 - (4) Costs of increases in premiums for the Standard Labor and Material Payment Bond and the Standard Performance Bond, provided coverage for the cost of the change in the Work results in such increased costs. At the Owner's request, the Contractor shall provide proof

of his notification to the Surety of the change in the Work and of the Surety's agreement to include such change in its coverage. The cost of the increase in premium shall be an allowable cost but shall not be marked up.

- (5) Contractor and Subcontractor overhead costs as set forth in Subsection (d) markups above.
- (6) If the change in the Work also changes the Time for Completion or Contract Completion Date by adding days to perform the Work, an itemized accounting of the following Site direct overhead expenses for the change to the time may be considered as allowable costs for compensation in addition to those shown above:

The Site superintendent's prorata salary, temporary Site office trailer expense, and temporary Site utilities including basic telephone service, electricity, heat, water, and sanitary / toilet facilities. All other direct and indirect overhead expenses are considered covered by and included in the Subsection (d) markups above.

- (7) Any other costs directly attributable to the change in the Work with the exception of those set forth below.
- (f) Allowable costs for changes in the Work shall not include the following:
- (1) Costs due to the negligence of the Contractor, any Subcontractor, Supplier, their employees or other persons for whom the Contractor is responsible, including, but not limited to, costs for the correction of Defective Work, for improper disposal of material, for equipment wrongly supplied, for delay in performing the Work, or for delay in obtaining materials or equipment.
 - (2) Home office expenses including payroll costs for the Contractor's officers, executives, administrators, project managers, accountants, counsel, engineers, timekeepers, estimators, clerks, and other similar administrative personnel employed by the Contractor, whether at the Site or in the Contractor's principal or branch office for general administration of the Work. These costs are deemed overhead included in the percentage markups allowable in Subsection (d) above.
 - (3) Home and field office expenses not itemized in Subsection 38(e)(6) above. Such items include, but are not limited to, expenses of Contractor's home and branch offices, Contractor's capital expenses, interest on Contractor's capital used for the Work, charges for delinquent payments, small tools, incidental job costs, rent, utilities, telephone and office equipment, and other general overhead expenses.
 - (4) Other items reasonably determined by the owner to not be allowed.
- (g) All Change Orders, except the "initial" Change Orders authorizing work citing Subsection 38(a)(3) procedures, must state that the Contract Time for Completion or Contract Completion Date is not changed or is either increased or decreased by a specific number of days. The old Time for Completion and, if changed, the new Time for Completion must be stated.

If the Contractor requests an extension to the Time for Completion or a later Contract Completion Date, he must provide written justification for the extension to the Architect/Engineer and to the Owner. The written justification must demonstrate an anticipated actual increase in the time required to complete the Work beyond that allowed by the Contract as adjusted by prior change orders or amendments to the Contract, not just an increase or decrease in the time needed to complete some portion of the total Work. When a CPM schedule is required by the Contract, no extension to the Time for Completion or Contract Completion Date shall be allowed unless, and then only to the extent that, the additional or changed Work increases the length of the critical path beyond the Time for Completion or Contract Completion

Date. If approved, the increase in time required to complete the Work shall be added to the Time for Completion or Contract Completion Date.

The Owner may decrease, by Change Order, the Time for Completion or Contract Completion Date when an Owner-requested deletion from the Work results in a decrease in the actual time required to complete the Work as demonstrable on the Bar Graph Schedule or on the CPM Schedule, whichever is appropriate. The Contractor may submit a request to decrease, by Change Order, the Time for Completion or Contract Completion Date under the procedures and subject to the considerations set forth in Section 19(f). No request for such decrease shall be considered for approval unless the proposed shorter schedule is otherwise acceptable under Sections 19(b) or (c), whichever is applicable. The Change Order decreasing the Time for Completion or changing the Contract Completion Date must be signed by both the Owner and the Contractor.

With the exception of Change Orders under Subsection 38(a)(3), which shall arrive at a change to the Contract Price and any change to time using the procedures set forth therein, each Change Order shall include all time and monetary impacts of the change, whether the Change Order is considered alone or with all other changes during the course of the Project. Failure to include a change to time and Contract Price in Section 38(a)(1) or (2) Change Orders shall waive any change to the time and Contract Price unless the parties mutually agree in writing to postpone a determination of the change to time and price resulting from the Change Order. Such a determination may be postponed not more than forty-five (45) days to give the Contractor an opportunity to demonstrate a change in the time and price needed to complete the Work. During any such postponement, the Work shall proceed, unless the Owner agrees otherwise.

If at any time there is a delay in the critical path of the Work due to postponement, due to the Contractor's efforts to justify an extension of the time or an increase in the Contract Price, or due to the Contractor's refusal to proceed with any of the Work, pending agreement on a change in time or price, such delay and any Contractor costs resulting from it shall not serve as the basis for the extension of the Time for Completion or Contract Completion Date or for an increase in the Contract Price.

- (h) The acceptance by the Contractor of any payment made by the Owner under a Change Order shall be and operate as a release to the Owner of all claims by the Contractor and of all liability owing to the Contractor for all things done or furnished in connection with the Work described in the Change Order. The execution of any Change Order by the Owner shall not be an acceptance of any Work or materials not in accordance with the Contract Documents, nor shall it relieve the Contractor of responsibility for faulty materials or workmanship or operate to release the Contractor or his surety from any obligation arising under the Contract or the Standard Performance Bond or Standard Labor and Material Payment Bond.
- (i) Payments will not be made for any Work, labor or materials performed on a unit price or a Subsection 38(a)(3) basis until the Contractor has furnished the Owner documents, certified as true and correct by an authorized officer or agent of the Contractor, evidencing the cost of such Work, labor and materials. The Owner may require any or all of the following documentation to be provided by the Contractor.

For Work performed on a Unit Price basis:

- (1) Certified measurements of authorized and approved excavations, over-excavations, fills and/or backfills, and similar work; and/or
- (2) Certified measurements of piling installed, caissons installed, and similar work; and/or
- (3) Daily records of waste materials removed from the Site and/or fill materials imported to the Site.

For Work performed on a Subsection 38(a)(3) basis:

- (1) Certified payroll records showing the name, classification, date, daily hours, total hours, rate, and extension for each laborer, foreman, supervisor or other worker;

- (2) Equipment type & model, dates, daily hours, total hours, rental rate or other specified rate, and extension for each unit of equipment;
- (3) Invoices for materials showing quantities, prices, and extensions;
- (4) Daily records of waste materials removed from the Site and/or fill materials imported to the Site;
- (5) Certified measurements of over-excavations, piling installed and similar work; and/or
- (6) Transportation records for materials, including prices, loads, and extensions.

Requests for payment shall be accompanied and supported by invoices for all materials used and for all transportation charges claimed. If materials come from the Contractor's own stock, then an affidavit may be furnished, in lieu of invoices, certifying quantities, prices, etc. to support the actual cost.

39. EXTRAS

If the Contractor claims that any instructions given to him by the Architect/Engineer or by the Owner, by drawings or otherwise, involve extra Work which increases the scope of the Contract, then, except in emergencies endangering life or property, he shall give the Architect/Engineer and the Owner written notice thereof before proceeding to execute the Work. Said notice shall be given promptly enough to avoid delaying the Work and in no instance later than fourteen (14) days after the receipt of such instructions. Should it not be immediately clear to the Contractor that the change involves extra Work outside the scope of the Contract, written notice shall be sufficient if given as soon as possible after such realization, but in no event later than fourteen (14) days after the start of such Work. If the Owner agrees, a Change shall be issued as provided in Section 38 of these General Conditions, and any additional compensation shall be determined by one of the three (3) methods provided in said Section 38, as selected by the Owner. [Except as otherwise specifically provided, no claims for extra Work shall be allowed unless timely notice, as required by this Section, is given by the Contractor and unless such Work is performed pursuant to written Change Order or notice as provided in Section 38. The Change Order shall designate which of the three methods for computing charges and credits set forth in said Section 38(a) shall be used.]

40. CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT

If the Work should be stopped under an order of any court or other public authority for a period of ninety (90) days through no fault of the Contractor or anyone employed by him, or if the Owner should fail to pay to the Contractor within thirty (30) days any sum certified by the Architect/Engineer when no dispute exists as to the sum due or any provision of the Contract, then the Contractor may, upon ten (10) calendar days written notice to the Owner and the Architect/Engineer, stop Work or terminate the Contract and recover from the Owner payment for the cost of the Work actually performed, together with overhead and profit thereon, but profit on the Work performed shall be recovered only to the extent that the Contractor can demonstrate that he would have had profit on the entire Contract if he had completed the Work. The Contractor may not receive profit or any other type of compensation for parts of the Work not performed. The Contractor may recover the reasonable cost of physically closing down the Site, but no other costs of termination. The Owner may offset any claims it may have against the Contractor against the amounts due to the Contractor. In no event shall termination of the Contract by the Contractor terminate the obligations of the Contractor's surety on its payment and performance bonds.

41. OWNER'S RIGHT TO TERMINATE THE CONTRACT FOR CAUSE

- (a) If the Contractor should be adjudged as bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency, the Owner may terminate the Contract. If the Contractor should refuse or should repeatedly fail, except in cases for which extension of time is provided, to supply enough properly skilled

workmen or proper materials and equipment, or if he should fail to make prompt payment to Subcontractors or Suppliers of material or labor, or if he should disregard laws, ordinances or the written instructions of the Architect/Engineer or the Owner, or otherwise be in substantial violation of any provision of the Contract, then the Owner may terminate the Contract.

- (b) Prior to termination of the Contract, the Owner shall give the Contractor and his surety ten (10) calendar days written notice pursuant to Section 1 ("Notice") of these General Conditions, during which the Contractor and/or his surety may rectify the basis for the notice. If rectified to the satisfaction of the Owner within said ten (10) days, the Owner may rescind its notice of termination. If not, the termination for cause shall become effective at the end of the ten (10) day notice period. In the alternative, the Owner may, in writing, postpone the effective date of the termination for cause, at its sole discretion, if it should receive reassurances from the Contractor and/or its surety that the basis for the termination will be remedied in a time and manner which the Owner finds acceptable. If at any time after such postponement, the Owner determines that Contractor and/or its surety has not or is not likely to rectify the causes of termination in an acceptable manner or within the time allowed, then the Owner may immediately terminate the Contract for cause, without the necessity of further ten (10) day notice, by notifying the Contractor and his surety in writing of the termination. In no event shall termination for cause terminate the obligations of the Contractor's surety on its payment and performance bonds.
- (c) Upon termination of the Contract, the Owner shall take possession of the Site and of all materials, tools and equipment thereon. If no security has been provided pursuant to Section 8 herein, the Owner shall finish the Work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment. If the expense of finishing the Work, including compensation for additional managerial and administrative services, shall exceed the unpaid balance of the Contract Price, the Contractor shall pay the difference to the Owner, together with any other expenses of terminating the Contract and having it completed by others. If security has been provided pursuant to Section 8 herein, the Owner shall provide Notice to the Surety as set forth in Subsection (b) herein and proceed as set forth in the Standard Performance Bond, CO-10, Form # DGS-30-084, and the Terms and Conditions therein.
- (d) If it should be judicially determined that the Owner improperly terminated this Contract for cause, then the termination shall be deemed to be a termination for the convenience of the Owner.
- (e) Termination of the Contract under this Section is without prejudice to any other right or remedy of the Owner.

42. TERMINATION BY OWNER FOR CONVENIENCE

- (a) Owner may terminate this Contract, in whole or in part, at any time without cause upon giving the Contractor written notice of such termination pursuant to Section 1 ("Notice") of these General Conditions. Upon such termination, the Contractor shall immediately cease Work and remove from the Site all of its labor forces and such of its materials as Owner elect not to purchase or to assume in the manner hereinafter provided. Upon such termination, the Contractor shall take such steps as Owner may require to assign to the Owner the Contractor's interest in all Subcontracts and purchase orders designated by Owner. After all such steps have been taken to Owner's satisfaction; the Contractor shall receive as full compensation for termination and assignment the following:
 - (1) Amounts due for Work performed in accordance with the Contract subsequent to the latest approved Schedule of Values and Certificate for Payment (Form CO-12) through the date of termination,
 - (2) Reasonable compensation for the actual cost of demobilization incurred by the Contractor as a direct result of such termination. The Contractor shall not be entitled to any compensation or damages for lost profits or for any other type of contractual compensation or damages other than those provided by the preceding sentence. Upon

payment of the foregoing, Owner shall have no further obligations to Contractor of any nature.

- (b) In no event shall termination for the convenience of the Owner terminate the obligations of the Contractor's surety on its payment and performance bonds.

43. DAMAGES FOR DELAYS; EXTENSION OF TIME

- (a) If the Contractor is delayed at any time in the progress of the Work by any act or omission of the Owner, its agents or employees or any separate independent contractor of the Owner, and the act or omission is the result of or is necessitated by causes outside the Owner's control; or if the Contractor is delayed by strikes, fires, unusual delays in transportation or unavoidable casualties, or other causes outside the Owner's or Contractor's control, the Contractor shall give the Owner and Architect/Engineer written notice within ten (10) days of the inception of the delay. The Owner shall extend the time for Substantial Completion or Final Completion, as the case may be, for the length of time that the Substantial Completion or Final Completion of the Work was actually delayed thereby, and the Contractor shall not be charged with liquidated or actual damages for delay during the period of such extension nor shall the Contractor be due compensation or damages of any kind, under any theory of law, as a result of such delay, the impact of such delay, or acceleration of Work as a result of such delay. In the event a CPM schedule is required by the Contract, no extension of the time allowed for Substantial Completion shall be granted unless the Contractor demonstrates a delay in the critical path of the approved CPM schedule or approved bar graph schedule.
- (b) If the Contractor is delayed at any time in the progress of the Work by any act or omission of the Owner, its agents or employees, due to causes within their control, or delayed by the Owner's separate, independent contractors, when such delay results from causes within the Owner's control, and the Contractor intends to seek additional compensation for damages, if any, caused by the delay, the Contractor shall inform the Owner and the Architect/Engineer immediately at the time of the occurrence giving rise to the delay by the fastest means available and shall give written notice no later than two (2) working days after inception of the delay. The Contractor's notice to the Owner shall specify the nature of the delay claimed by the Contractor, the cause of the delay and the impact of the delay on the Contractor's Work schedule. The Owner shall then have three (3) working days to respond to the Contractor's notice with a resolution, remedy or direction to alleviate the delay or with a notice rejecting the claim for delay alleged to be caused by the Owner or parties for whom the Owner is responsible. If the issue is not then resolved, the Contractor may submit a request for Change Order in accordance with Sections 38 and 39 or submit a claim as provided for in Section 47. The Contractor shall only be entitled to additional compensation if the delay was unreasonable and was caused solely by acts or omissions of the Owner, its agents or employees, due to causes within their control, or was caused by the Owner's separate, independent contractor, when such delay resulted solely from causes within the Owner's control.
- (c) The Contractor shall not be entitled to an extension of the Time for Completion or Contract Completion Date or to any additional compensation for delays caused by acts or omissions of the Contractor due to causes within his control, including, but not limited to, delays resulting from Defective Work including workmanship and/or materials, from rejected work which must be corrected before dependent work can proceed, from Defective Work or rejected work for which corrective action must be determined before like work can proceed, or from incomplete, incorrect or unacceptable Submittals or samples.
- (d) No extension of time or additional compensation, if applicable, will be granted for any delay unless the claimed delay directly affects the critical path of the approved CPM schedule or the schedule shown on the approved bar graph schedule, whichever is applicable, and any float has been consumed. No extension of time or additional compensation shall be given for a delay if the Contractor failed to give notice in the manner and within the time prescribed in Subsections (a) or (b) above, whichever applies. Furthermore, no extension of time or additional compensation shall be given for any delay unless a claim therefor is made in writing to the Owner, with a copy to the Architect/Engineer, within twenty (20) days of the end of the delay. The claim shall state the cause of the delay, the number of days of extension

requested and any compensation requested by the Contractor. The Contractor shall report the termination of the delay to the Owner and Architect/Engineer not less than ten (10) days after such termination. Failure to give notice of either the inception or the termination of the cause of delay or failure to present a claim for extension of time and/or monetary compensation within the times prescribed shall constitute a waiver of any claim for extension or additional compensation based upon that cause.

- (e) Requests for compensation for delays pursuant to Subsection (b) above must be substantiated by itemized data and records clearly showing that the Work delayed was on the critical path of the approved CPM schedule or on the sequence of Work on the approved bar graph schedule, as modified, and that the additional costs incurred by the Contractor are directly attributable to the delay in the Work claimed. Furthermore, compensation for delay shall be calculated from the contractual Time for Completion or Contract Completion Date, as adjusted by Change Order, and shall not be calculated based on any early completion planned or scheduled by the Contractor, unless a Change Order has been executed pursuant to Section 19(f) changing the Time for Completion or the Contract Completion Date to reflect such early completion. See Section 19 for procedures for the Contractor to follow if he plans early completion of the Work and wishes to request a Change Order reflecting the early completion date.

If there is an extension in the Time for Completion or the Contract Completion Date and if the Contractor is entitled to compensation under Subsection 43 (b), and where there is no change in the Work, an itemized accounting of the following direct Site overhead expenses will be considered as allowable costs to be used in determining the compensation due the Contractor:

Site superintendent prorata salary, temporary Site office expense, temporary Site facilities, and temporary Site utilities including basic telephone service, electricity, heat, water, and sanitary/toilets. A fifteen percent (15%) markup of these expenses may be allowed to compensate the Contractor for home office and other direct or indirect overhead expenses only if explicitly authorized in the supplemental general conditions.

- (f) If the Contractor submits a claim for delay damages pursuant to Subsection 43(b) above, the Contractor shall be liable to the Owner for a percentage of all costs incurred by the Owner in investigating, analyzing, negotiating and litigating the claim, which percentage shall be equal to the percentage of the Contractor's total delay claim which is determined through litigation to be false or to have no basis in law or in fact. (§ 2.2-4335, Code of Virginia)
- (g) Any change in the Contract Time for Completion or Contract Completion Date shall be accomplished only by issuance of a Change Order.
- (h) If the Contractor fails to complete the Work within the Time for Completion or the Contract Completion Date, the Contractor shall be liable to the Owner in the amounts set forth in the Supplemental General Conditions, if any, not as a penalty, but as fixed, agreed and liquidated damages for delay until the Work is substantially or finally completed as the case may be. If liquidated damages are not so fixed in the Supplemental General Conditions, the Contractor shall be liable for any and all actual damages sustained as a result of delay. In addition to damages for delay, whether liquidated or actual, the Contractor shall also be liable for any and all actual damages sustained by the Owner as a result of any other breach of the Contract, including, but not limited to, Defective Work and abandonment of the Contract.
- (i) If liquidated damages are provided by the Contract between the Owner and the Contractor, the following provisions apply:
 - (1) If the Work is not substantially complete by the Time for Completion or Contract Completion Date, the Contractor shall owe to the Owner, not as a penalty but as Step One liquidated damages, the sum stated in the Supplemental General Conditions for Step One liquidated damages for each and every partial or total calendar day of delay in Substantial Completion.

- (2) Once the Work is substantially complete, the accrual of Step One liquidated damages shall cease and the Contractor shall have thirty (30) calendar days in which to achieve Final Completion of the Work.
- (3) If Final Completion of the Work is not achieved on or before the thirtieth (30th) calendar day after Substantial Completion, and if the Owner has not granted any extension of time, the Contractor shall owe to the Owner, not as a penalty but as Step Two liquidated damages, the sum stated in the Supplemental General Conditions as Step Two liquidated damages for each and every partial or total calendar day of delay in Final Completion.

44. INSPECTION FOR SUBSTANTIAL COMPLETION & FINAL COMPLETION

- (a) The Contractor shall notify the Owner, in writing on the Certificate of Partial or Substantial Completion by the Contractor (Form CO-13.2a), of the date when the Work or designated portion thereof, will be, in his opinion, substantially complete and ready for inspection and testing to determine if it has reached Substantial Completion. The notice shall be given at least ten (10) days in advance of said date and shall be forwarded through the Architect/Engineer, who will attach his written endorsement as to whether or not he concurs with the Contractor's statement that the Work will be ready for inspection and testing on the date given. The Architect/Engineer's endorsement is a convenience to the Owner only and shall not relieve the Contractor of his responsibility in the matter nor shall the Architect/Engineer's endorsement be deemed to be evidence that the Work was substantially complete and ready for inspection and testing. Inspection and testing shall take place at a time(s) mutually agreeable to the Contractor, Owner and Architect/Engineer.

The inspection shall include a demonstration by the Contractor that all equipment, systems and operable components of the project function properly and in accordance with the Contract Documents. The Contractor shall furnish access for the inspection and testing as provided in Section 21 of these General Conditions. The inspection and testing shall determine whether Substantial Completion has been accomplished and shall result in a written list of unfinished Work and Defective Work, commonly referred to as a "punch list", which must be finished and corrected to obtain Final Completion.

After successful completion of the testing and the Architect / Engineer determines that, in its opinion, the Work, either in whole or in part, is substantially complete, the Architect / Engineer shall notify the Owner, in writing on the Certificate of Partial or Substantial Completion by the Architect/Engineer (Form CO-13.1a), that the Work, or a specified portion thereof, is recommended to be declared substantially complete. The Owner shall notify the Contractor, in writing, of the date the Owner accepts the Work, or the specified portion thereof, as substantially complete or the Owner shall notify the Contractor of the deficiencies to be corrected or completed before such Work will be accepted as substantially complete.

- (b) The Contractor shall notify the Owner, in writing on the Certificate of Completion by the Contractor (form CO-13.2), of the date when the Work has reached or will reach Final Completion and will be ready for final inspection and testing. The notice shall be given at least five (5) days in advance of said date and shall be forwarded through the Architect/Engineer, who will attach his endorsement as to whether or not he concurs in the Contractor's statement that the Work will be ready for inspection and testing on the date given. That inspection and any necessary testing shall be conducted in the same manner as the inspection for Substantial Completion. When the Work is finally and totally complete, including the elimination of all defects, the Work shall be finally accepted by the Owner and final payment shall be made in accordance with Section 36 of these General Conditions.
- (c) The Architect/Engineer shall conduct the inspections. The Owner may elect to have other persons of its choosing also participate in the inspections. If one or more Substantial or Final Completion re-inspections are required, the Contractor shall reimburse the Owner for all costs of re-inspection or, at the Owner's option, the costs may be deducted from payments due to the Contractor.

- (d) A representative of the State Fire Marshal's Office will either be present at the Substantial and Final Completion inspections or otherwise inspect the completed Work and advise the Owner whether the Work meets the fire safety requirements of the applicable building code.
- (e) Approval of Work at or as a result of any inspection required herein shall not release the Contractor or his surety from responsibility for complying with the Contract.

45. GUARANTEE OF WORK

- (a) Except as otherwise specified, all Work shall be, and is hereby, guaranteed by the Contractor against defects resulting from the use of materials, equipment or workmanship, which are defective, inferior, or not in accordance with the terms of the Contract, for one (1) year from the date of Final Completion of the entire Project by the Owner. Equipment and facilities which have seasonal limitations on their operation (e.g. heating or air conditioning units) shall be guaranteed for one (1) full year from the date of seasonally appropriate tests and acceptance, in writing, by the Owner. Where the Owner agrees to take Beneficial Occupancy of a portion or phase of the Work which has been determined to be substantially complete before the entire Work is finally completed, the guarantees for the materials, equipment and workmanship in that portion or phase shall begin on the date that the Owner takes Beneficial Occupancy, unless otherwise specified in the Supplemental General Conditions, Special Conditions, or by separate agreement.
- (b) If, within any guarantee period, Work which is not in accordance with the Contract, Defective Work, or inferior material, equipment or workmanship is noted by the Owner or Architect/Engineer which requires or renders necessary repairs or changes in connection with the guaranteed Work, the Contractor shall, promptly upon receipt of notice from the Owner, such notice being given not later than two weeks after the guarantee period expires, and without expense to the Owner:
 - (1) Place in satisfactory condition in every particular all of such guaranteed Work and correct all defects, inferior materials, equipment or workmanship therein;
 - (2) Make good all damage to the structure or Site or equipment or contents thereof, which, in the opinion of the Owner or the Architect/Engineer, is the result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the terms of the Contract; and
 - (3) Make good any Work or materials or the equipment and contents of structures and/or Site disturbance that results from fulfilling the provisions of this Section.
- (c) In any case, when in fulfilling the requirements of the Contract and this guarantee or any other guaranty or warranty, the Contractor disturbs any work performed by a separate contractor, he shall restore such work to a condition satisfactory to the Architect/Engineer and Owner and guarantee such restored work to the same extent as if it was guaranteed under this Contract.
- (d) If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee as set forth in this Section, the Owner may have the defects or inferior materials, equipment or workmanship corrected and the Contractor and his surety shall be liable for all expense incurred.
- (e) All special warranties and guarantees applicable to definite parts of the Work that may be stipulated in or required by the Contract Documents shall be subject to the terms of this Section during the first year of the life of such special warranty or guarantee.
- (f) The guarantee of this Section shall be in addition to and not in lieu of all other warranties, express or implied, applicable to or arising from this Contract or by law.

- (g) Nothing contained in this Section shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including liability for Defective Work under Section 30. This Section relates only to the specific obligation of the Contractor as set forth in this Section to correct the Work and does not limit the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor the time within which proceedings may be commenced to establish the Contractor's liability with respect to his other obligations under the Contract Documents.
- (h) In the event the Work of the Contractor is to be modified by another contractor, either before or after the Final Inspection provided by Section 44 of the General Conditions, the first Contractor shall remain responsible in all respects under this Section's Guarantee of Work and under any other warranties or guarantees, express or implied, applicable to or arising from this Contract or by law. However, the Contractor shall not be responsible for any defects in material or workmanship introduced by the contractor modifying his Work. The first Contractor and the contractor making the modifications shall each be solely responsible for his respective work. The contractor modifying the earlier Work shall be responsible for any damage to or defect introduced into the Work by his modification. If the first contractor claims that a subsequent contractor has introduced defects of materials and/or workmanship into his Work, it shall be the burden of the contractor making the claim to demonstrate clearly the nature and extent of such introduced defects and the other contractor's responsibility for those defects. Any contractor modifying the work of another shall have the same burden if he asserts that defects in his work were caused by the contractor whose work he is modifying.

46. ASSIGNMENTS

Neither party to the Contract shall assign the Contract in whole or any part without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the prior written consent of the Owner. Consent to assignment shall not be unreasonably withheld. No assignment shall relieve any party from its obligations under the Contract.

47. CONTRACTUAL DISPUTES (§2.2-4363, Code of Virginia)

Contractual claims, whether for money or for other relief, shall be submitted, in writing, no later than sixty (60) days after final payment; however, written notice of the Contractor's intention to file such claim must be given at the time of the occurrence or beginning of the Work upon which the claim is based. The filing of a timely notice is a prerequisite to recovery under this Section. Although the Contractor may be required to submit certain classes of claims prior to final payment, and the Contractor is not prevented from filing claims during the pendency of the Work, the Owner shall not be obligated to render a final written decision on any claim until after final payment. All claims shall be submitted along with all practically available supporting evidence and documentation.

No written decision denying a claim or addressing issues related to the claim, if rendered prior to final payment, shall be considered a denial pursuant to this Section unless the written decision makes express reference to this Section and is signed by the Agency head or his designee. The Contractor may not institute legal action prior to receipt of the Owner's final written decision on the claim unless the Owner fails to render such a decision within ninety (90) days of submission of the claim at which time the claim shall be deemed denied.

The decision of the agency head or other signatory on the Contract shall be final and conclusive unless the Contractor within six (6) months of the date of the final decision on a claim, initiates legal action as provided in §2.2-4364 of the Code of Virginia. Failure of the Owner to render a decision within 90 days shall not result in the Contractor being awarded the relief claimed nor shall it result in any other relief or penalty. The sole result of the Owner's failure to render a decision within 90 days shall be the Contractor's right to immediately institute legal action. No administrative appeals procedure pursuant to §2.2-4365 of the Code of Virginia has been established for contractual claims under this Contract.

Pursuant to § 2.2-4366, Alternative Dispute Resolution, of the Code of Virginia, the Owner may enter into an agreement with the Contractor to submit disputes arising from the performance of this Contract to arbitration and utilize mediation and other alternative dispute resolution procedures. However, such procedures entered into by the Owner, the Commonwealth, or any department, institution, division, commission, board or bureau thereof, shall be non-binding and subject to § 2.2-514, as applicable.

48. ASBESTOS

- (a) This subsection applies to projects involving existing buildings where asbestos abatement is not a part of the Work, when the scope of the project has been reviewed and a comprehensive survey conducted by an individual licensed by the Virginia Department of Professional and Occupational Regulation to conduct building inspections for asbestos containing materials in buildings, and where the Owner has attempted to remove or encapsulate all asbestos containing material that may become friable or damaged during this Project.

Prior to commencement of Work, the results of the comprehensive survey or any other asbestos survey shall be made available to the Contractor, who shall be responsible for performing his Work so as not to disturb any remaining asbestos, encapsulated or otherwise, identified in such survey or surveys.

If the Contractor discovers or inadvertently disturbs any material that he knows, should have known or has reason to believe, may contain asbestos that has not been previously identified, was overlooked during the removal, was deemed not to be friable or was encapsulated, the Contractor shall stop Work in the area containing or suspected to contain the asbestos, secure the area, and notify the Owner and the Architect/Engineer immediately by telephone or in person with written notice as soon as possible. The Owner will have the suspect material sampled.

If the sample is positive and must be disturbed in the course of the Work, the Owner shall have the material repaired or removed and shall pay for the bulk sample analysis.

Except as provided in §11-4.1 of the Code of Virginia, if the material disturbed is not within the Contractor's authorized Work and/or Work area or under this Contract, the Contractor shall pay for all associated sampling and abatement costs.

- (b) If asbestos abatement is included as a part of the Work, the Contractor shall assure that the asbestos abatement work is accomplished by those duly licensed as described in Section 3 of these General Conditions and in accordance with the specific requirements of the Contract and all applicable laws and regulations.
- (c) If asbestos abatement is included as part of the Work, the licensed asbestos Subcontractor shall obtain the insurance required under Section 11 (e) of these General Conditions.

49. TRAINING, OPERATION AND MAINTENANCE OF EQUIPMENT

- (a) As a part of the Work, the Contractor in conjunction with his Subcontractors and Suppliers shall provide the Owner's operations and maintenance personnel with adequate instruction and training in the proper operation and maintenance of any equipment, systems, and related controls provided or altered in the Work. The training requirements may be further defined in the specifications.
- (b) The Contractor shall provide the Owner with a minimum of two (2) copies of operating, maintenance and parts manuals for all equipment and systems provided in the Work. Further specific requirements may be indicated in the specifications.

50. PROJECT MEETINGS

- (a) The intention of this Section is that the Contractor, the Owner and the A/E have timely exchange of information and cooperate to accomplish the Work as required by the Contract Documents. The Contractor is responsible for managing the Work, obtaining approvals and requesting clarifications on a timely, reasonable basis. The Owner and its A/E are responsible for making a reasonable effort to provide timely responses to the Contractor.
- (b) **Preconstruction Meeting:**
Prior to the start of construction and no later than 15 calendar days after the Notice to Proceed, a "Preconstruction" meeting shall be held with attendees to include the Owner's Project Manager and Project Inspector, the Architect/Engineer's project manager and representatives of each design discipline involved in the Project, the Regional Fire Marshal, the Contractor's project manager and superintendent (and scheduler, if Contractor desires), and representatives of the Contractor's major Subcontractors. The purpose of the meeting is to clarify and discuss the specifics related to, but not limited to, the following:
 - (1) Persons involved from each entity and their chain of authority including the names of persons authorized to sign Change Orders and any limits to their authority. Name of Contractor's on-site certified Responsible Land Disturber.
 - (2) Names, addresses, telephone numbers and FAX numbers to be used for Requests for Information (RFI), Requests for Clarification (RFC), Requests for Proposals (RFP), shop drawings, Submittals, and notices.
 - (3) Contractor's proposed construction schedule and Owner's sequencing requirements, if any.
 - (4) Schedule of Values and Certificate for Payment (Form C0-12) requirements and procedures.
 - (5) Procedures for shop drawings, product data and Submittals.
 - (6) Procedures for handling Field Orders and Change Order Form C0-11.
 - (7) Procedures for Contractor's request for time extension, if any.
 - (8) Construction Site requirements, procedures and clarifications to include:
 - Manner of conducting the Work
 - Site specialties such as dust and erosion control, stormwater management, project signs, clean up and housekeeping, temporary facilities, utilities, security, and traffic
 - Safety
 - Layout of the Work
 - Quality control, testing, inspections and notices required
 - Site visits by the A/E and others
 - Owner's Project Inspector duties
 - Running Punch List
 - As-Built Drawings
 - (9) Procedures and documentation of differing or unforeseen Site conditions
 - (10) Monthly Pay Meeting
 - (11) Project Close-Out requirements and procedures
 - (12) Project records

(c) **Monthly Pay Meeting:**

Section 36 establishes the requirement for a monthly pay meeting which will usually be held at or near the Site. In addition to Owner, A/E and Contractor representatives, the following representatives, at a minimum, should be available to attend portions of the meeting, as applicable or necessary:

- Owner's Project Inspector
- Contractor's project superintendent
- A/E representative of each discipline where Work was performed for the current pay request or where Work is projected to be performed in the coming month.
- A representative of each subcontractor who performed work included in the current pay request.
- A representative of each subcontractor who is projected to perform work in the coming month.

The following topics should be included, as a minimum, in the monthly pay meeting:

- (1) Observations of status, quality and workmanship of Work in progress
- (2) Validation of the Schedule of Values and Certificate for payment
- (3) Conformance with proposed construction schedule
- (4) Outstanding Requests for Information, Requests for Clarification and Requests for Proposal
- (5) Submittals with action pending
- (6) Status of pending Change Orders
- (7) Status of Running Punch List items
- (8) Work proposed for coming pay period
- (9) Discussions of any problems or potential problems which need attention

(d) **Other Meetings:**

Requirements for other meetings, such as progress meetings, coordination meetings, pre-installation meetings and/or partnering meetings, may be included in the Contract Documents.

* * * END OF GENERAL CONDITIONS * * *

SUPPLEMENTAL GENERAL CONDITIONS

The Commonwealth of Virginia General Conditions of the Construction Contract, Form DGS-30-054 (CO-7), are modified and supplemented as hereinafter described.

1. Add the following Section 51 to the General Conditions of the Construction Contract:

“51. Small Businesses and Women-Owned and Minority-Owned (SWAM) Business Procurement Plan

The Owner has developed a “SWAM” plan for increasing procurement from small, women-owned, and minority-owned (SWAM) businesses in its construction program. The Owner’s SWAM aspirational goals and plan are included in the contract documents for use by the Contractor in developing its plan for involving small, women-owned, and minority-owned (SWAM) businesses through subcontracting, and through the purchasing of goods, materials, supplies and services in the Contractor’s construction program. The Owner’s plan provides criteria and goals for the Contractor in developing a plan, for submitting its plan and for reporting its achievements in meeting the goals established for the Contract.

The Contractor shall, as soon as practicable after the posting of the Notice of Intent to Award but not later than 30 days after the effective date of the contract, provide a list of Subcontractors that are proposed to perform the work, including SWAM subcontractors, vendors and suppliers showing their DMBE certification numbers where applicable. Upon receipt of the list, the Owner may, based on the Agency SWAM Procurement Plan require the Contractor to provide additional information on work that has been bid by SWAM contractors, and areas in which the scope of work may be reduced in size to increase the pool of potential SWAM contractors. Selection of particular Subcontractors for a certain part of the work shall be made in accord with Section 9, Subcontracts of the General Conditions.

DGS-30-376

(Rev. 02/10)

SUPPLEMENTAL GENERAL CONDITIONS

The Commonwealth of Virginia General Conditions of the Construction Contract, Form DGS-30-057 (CO-7CM), are modified and supplemented as hereinafter described.

1. Section 12 - INSURANCE FOR OWNER AND CONTRACTOR

Delete Paragraph (a).

This Contract, dated this _____ day of _____, 2010 between

_____ (“Owner”) and
_____ (“Contractor”),
is binding among and between these parties as of the date of the Owner’s signature.

The Project Code (PC#) indicated above is required to be shown for identification purposes on all project-related material and documents including but not limited to, Notices, Change Orders, Submittals, Requests For Information, Requests For Quotes, Field Orders, minutes of meetings, correspondence, Schedule of Values and Certificate For Payment (Form CO-12), test reports, and related materials.

3. After competitive sealed bidding pursuant to the Virginia Public Procurement Act, Contractor is awarded this Contract to perform the Work described by the Contract Documents for the above-described project ("the Project").

THEREFORE, in consideration of the Recitals set forth above, and good and valuable consideration as set forth below, the parties agree as follows:

1. STATEMENT OF WORK: The Contractor shall furnish all labor, equipment, and materials and perform all Work for the Project in strict accordance with the Contract Documents.

2. CONTRACT DOCUMENTS: This Contract shall consist of the following:

- this Contract Between Owner and Contractor (Form CO-9);
- the Bid Form submitted by the Contractor;
- Post Bid Modification(s), if any, dated _____;
- the General Conditions of the Construction Contract (Form CO-7),
(referred to as the "General Conditions")
- the Supplemental General Conditions, if any;
- the Special Conditions attached to the Owner's Invitation for Bids;
- the Owner's Project Plans and Specifications dated _____;
-
-
-

All of these documents are incorporated herein by reference.

3. TIME FOR COMPLETION: The Work shall be commenced on a date to be specified in a written order of the Owner and shall be Substantially Completed within _____ calendar days or not later than the Contract Completion Date which is _____. The Work shall be finally completed within 30 days after the date of Substantial Completion of the Work.

4. COMPENSATION TO BE PAID TO THE CONTRACTOR: The Owner agrees to pay and the Contractor agrees to accept as just and adequate compensation for the performance of the Work in accordance with the Contract Documents the sum of _____ dollars (\$_____).

5. PAYMENTS: The procedures for establishing a Schedule of Values for the Work, for requesting monthly progress payments for Work in place, and for requesting payments for properly stored materials are stated in the General Conditions. Unless otherwise provided under the Contract Documents, interest on payments due the Contractor shall accrue at the rate of one percent per month. §2.2-4354 of the Code of Virginia.

eVA Vendor Registration: The bidder or offeror shall be a registered vendor in eVA. See the attached **eVA Vendor Registration Requirements**.

6. CONTRACTUAL CLAIMS: Any contractual claims shall be submitted in accordance with the contractual dispute procedures set forth in Section 47 of the General Conditions and the supplemental instructions or procedures of the contracting State Agency, if any, attached to this Contract.

7. NON-DISCRIMINATION: §2.2-4311 of the Code of Virginia applies to this contract. See Section 4 of the General Conditions.

IN WITNESS WHEREOF, the parties hereto on the day and year written below have executed this agreement in three (3) counterparts, each of which shall, without proof or accountancy for the other counterparts, be deemed on original thereof.

For the CONTRACTOR:

By: _____
(signature in ink) (date)

(typed name)

(typed title)

Attest:

(signature in ink) (date)

For the OWNER:

By: _____
(signature in ink) (date)

(typed name)

(typed title)

Attest:

(signature in ink) (date)

Attachments:

- Bid Form Submitted by the Contractor
- Post Bid Modification, if any

COMMONWEALTH OF VIRGINIA

WORKERS' COMPENSATION

Certificate of Coverage

Section 2.2-4332, Code of Virginia, requires construction contractors and subcontractors to obtain and maintain workers' compensation insurance while performing work on behalf of the Commonwealth of Virginia, its departments, institutions, or agencies. This same requirement applies on behalf of local governments.

Evidence of coverage must be provided prior to commencement of Work.

This form must be completed and returned to the organization contracting the Work.

The undersigned organization stipulates that it:

- A. has workers' compensation insurance and is in compliance with the Workers' Compensation statutes of the Commonwealth of Virginia. ☐ Yes ☐ No
Insurance Company _____
Policy expiration date _____
- B. is self insured for workers' compensation. ☐ Yes

Title of Construction Contract: _____

Contract Number: _____

Signed by: _____

Title: _____

Firm Name: _____

Address: _____

**COMMONWEALTH OF VIRGINIA
STANDARD PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS: That _____, the Contractor ("Principal") whose principal place of business is located at _____ and _____ ("Surety") whose address for delivery of 'Notices' is located at _____ are held and firmly bound unto the Commonwealth of Virginia, _____, the Owner ("Obligee") in the amount of _____ Dollars (\$ _____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Principal has by written agreement dated _____ entered into a contract with Obligee for _____ which contract (the "Contract") is by reference expressly made a part hereof;

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall promptly and faithfully perform said Contract in strict conformity with the plans, specifications and conditions of the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Provided, that any alterations which may be made in the terms of the Contract, or in the Work to be done under it, or the giving by the Obligee of any extension of time for the performance of the Contract, or any other alterations, extensions or forbearance on the part of either or both of the Obligee or the Principal to the other shall not in any way release the Principal and the Surety, or either of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety of any such alterations, extension, or forbearance being hereby waived.

No action shall be brought on this bond unless brought within one year after: (a) completion of the Contract and all Work thereunder, including expiration of all warranties and guarantees, or (b) discovery of the defect or breach of warranty or guarantee if the action be for such.

The Surety represents to the Principal and to the Obligee that it is legally authorized to do business in the Commonwealth of Virginia.

Signed and sealed this _____ day of _____

Contractor / Principal

(SEAL)

Witness

By: _____

Typed Name: _____

Title: _____

Surety

(SEAL)

By: _____

Attorney-in-Fact

Typed Name: _____

AFFIDAVIT AND ACKNOWLEDGEMENT OF ATTORNEY-IN-FACT

COMMONWEALTH OF VIRGINIA
(or alternatively, Commonwealth or State of _____)

CITY of _____

I, the undersigned notary public, do certify that _____, whose name is signed to the foregoing performance bond in the sum of _____ and dated _____ and which names the Commonwealth of Virginia, _____, as Obligee, personally appeared before me today in the above jurisdiction and made oath that he/she is the attorney-in-fact of _____, a _____ corporation which is the Surety in the foregoing bond, that he/she is duly authorized to execute on the above Surety's behalf the foregoing bond pursuant to the Power of Attorney noted above and attached hereto, and on behalf of the surety, he/she acknowledged the foregoing bond before me as the above Surety's act and deed.

She/he has further certified that her/his Power of Attorney has not been revoked.

[Complete if Power is recorded: Clerk's Office: _____;
Deed Book/Page No. or Instrument No.: _____.]

Given under my hand this _____ day of _____.

Notary Public

(SEAL)

My name (printed) is: _____

My registration number is: _____

My commission expires: _____

APPROVED:

Attorney General/Designee

Date

Terms and Conditions of the Performance Bond

- 1 The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the prompt and faithful performance of the Construction Contract, which is incorporated herein by reference.
- 2 If the Contractor promptly and faithfully performs the Construction Contract in strict conformity with the plans, specifications and conditions of the Construction Contract, the Surety and the Contractor shall have no obligations under this Bond.
- 3 In the event of the Contractor's Default, and subsequent notification to the Surety pursuant to Section 41 of the General Conditions of the Construction Contract, the Surety shall, within fourteen (14) days of receipt of such notice, contact the Owner in writing, and arrange a meeting with the Owner to discuss methods of completing the Construction Contract. See paragraph 4, below, for the options to be discussed. If the Surety fails to arrange a meeting or fails to attend such meeting, the Surety shall be deemed to be in default on this Bond and the Owner may, at its sole discretion, take what measures it deems necessary to protect the Owner's interests, without further notice to the Surety, and the Owner shall be entitled to enforce any remedy available to the Owner under the Construction Contract or under Virginia law.
- 4 Within thirty (30) days after such meeting, during which time the Surety may investigate and otherwise analyze the project, and which period shall not toll any Construction Contract time periods nor operate as a waiver of any of the Owner's rights, the Surety shall, at its own expense, notify the Owner in writing that it is taking one of the following actions, which shall be acceptable to the Owner, at the Owner's sole discretion:
 - 4.1 By written takeover agreement with the Owner, the Surety itself shall undertake to perform and complete the Construction Contract, which it may do through its licensed agents or through licensed independent contractors. If the Owner, at its sole discretion, consents, the Contractor may serve as the Surety's independent contractor (however, due to conflicts with the Virginia Public Procurement Act, the Owner may not directly contract with an otherwise qualified independent contractor produced by the Surety); or
 - 4.2 The Surety may, if acceptable to the Owner and at the Owner's sole discretion, waive its right to perform and complete the Construction Contract, and with reasonable promptness under the circumstances:
 - 4.2.1 Pay to the Owner all amounts for which it may be liable to the Owner as surety on this Performance Bond, including the damages described in paragraph 6 below; or
 - 4.2.2 Deny liability, in whole or in part, and provide written notice thereof to the Owner, citing reasons therefor.

- 5 If, after the meeting described in paragraph 4, above, the Surety does not proceed with reasonable promptness with one of the options provided in subparagraphs 4.1 or 4.2 (including its subparts), above, the Owner may send additional written notice to the Surety demanding that the Surety perform its obligations under the Bond. If the Surety does not proceed to perform its obligations under the Bond within fifteen (15) days after receipt of said notice, the Surety shall be deemed to be in default on this Bond. Thereafter, the Owner shall be entitled to enforce any remedy available to the Owner under the Bond, the Construction Contract or Virginia law. If the Surety proceeds as provided in Subparagraph 4.2, and the Surety and the Owner are unable to agree as to the amount for which the Surety may be liable to the Owner, or if the Surety has denied liability, in whole or in part, the Owner, without further notice, shall be entitled to enforce any remedy available to the Owner under the Bond, the Construction Contract or Virginia law. In such event, the Owner may immediately proceed to complete the work in any manner authorized by law.
- 6 After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1 or 4.2.1, above, then the responsibilities of the Surety to the Owner shall not be greater or less than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than or less than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, plus the increased cost of any change orders under the Construction Contract, provided the Owner commits the balance of the Construction Contract Price to the prompt and faithful completion of the Construction Contract, the Surety is obligated without duplication for:
 - 6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and
 - 6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

The Owner, at its sole discretion, may waive its claim to delay costs and/or liquidated damages.
- 7 The Surety shall not be liable to the Owner for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner, its officers, agencies, administrators, successors or assigns.
- 8 The Surety hereby waives notice of any changes, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations. The Surety understands and agrees that the penal amount of the bond shall be increased or decreased by any changes to time and amount incorporated into any Change Orders.

- 9 Any proceeding by the Owner, legal or equitable, under this Bond may be instituted in any Virginia state court of competent jurisdiction, as permitted under Section 8 of the General Conditions of the Construction Contract and Virginia Code § 2.2-4337 and 2.2-4340, or by the Contractor or Surety, as permitted under the Construction Contract or under Virginia law.
- 10 Notice to the Surety shall be mailed or delivered to the address shown on the Standard Performance Bond in the space for Surety address for delivery of Notices
- 11 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond when furnished to comply with statutory requirements.

12 DEFINITIONS

- 12.1 **Balance of the Construction Contract Price:** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
 - 12.2 **Construction Contract:** The agreement between the Owner and the Contractor identified on first page of the Standard Performance Bond, DGS-30-084, CO-10, including all Construction Contract Documents and duly executed modifications and change orders thereto.
 - 12.3 **Contractor Default:** Failure of the Contractor, as defined under Section 41 of the General Conditions to the Construction Contract, which has neither been remedied, as permitted under Section 41 at the Owner's sole discretion, nor expressly waived by the Owner, to perform or otherwise to comply with the terms of the Construction Contract.
- 13 Nothing in these General Conditions shall prevent a surety from becoming involved in the Construction Contract prior to termination, upon notice from the Owner of the Contractor's failure to promptly and faithfully perform the Construction Contract in strict conformity with the plans, specifications and conditions of the Construction Contract.

COMMONWEALTH OF VIRGINIA STANDARD LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That _____, the Contractor ("Principal") whose principal place of business is located _____ and _____ ("Surety") whose address for delivery of 'Notices' is located at _____ are held and firmly bound unto the Commonwealth of Virginia, _____, the Owner ("Obligee") in the amount of _____ Dollars (\$_____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Principal has by written agreement dated _____ entered into a contract with Obligee for _____ which contract (the "Contract") is by reference expressly made a part hereof;

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall promptly make payment to all claimants as hereinafter defined, for labor performed and material furnished in the prosecution of the Work provided for in the Contract, then this obligation shall be void; otherwise it shall remain in full force and effect, subject, however, to the following conditions.

The Principal and Surety, jointly and severally, hereby agree with Obligee as follows:

1. A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both for use in the performance of the Contract. A "subcontractor" of the Principal, for the purposes of this bond only, includes not only those subcontractors having a direct contractual relationship with the Principal, but also any other contractor who undertakes to participate in the Work which the Principal is to perform under the aforesaid Contract, whether there are one or more intervening subcontractors contractually positioned between it and the Principal (for example, a subcontractor). "Labor" and "material" shall include, but not be limited to, public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the work site.
2. Subject to the provisions of paragraph 3, any claimant who has performed labor or furnished material in accordance with the Contract documents in the prosecution of the Work provided in the Contract, who has not been paid in full therefor before the expiration of ninety (90) days after the day on which such claimant performed the last of such labor or furnished the last of such materials for which he claims payment, may bring an action on this bond to recover any amount due him for such labor or material, and may prosecute such action to final judgment and have execution on the judgment. The Obligee need not be a party to such action and shall not be liable for the payment of any costs, fees or expenses of any such suit.
3. Any claimant who has a direct contractual relationship with any subcontractor of the Principal from whom the Principal has not required a subcontractor payment bond, but who has no contractual relationship, express or implied, with the Principal, may bring an action on this bond only if he has given written notice to the Principal within one hundred eighty (180) days from the day on which the claimant performed the last of the labor or furnished the last of the materials for which he claims payment, stating with substantial accuracy the amount claimed and the name of the person for whom the Work was performed or to whom the material was furnished. Notice to the Principal shall be served by registered or certified mail, postage prepaid, in an envelope addressed to the Principal at any place where his office is regularly maintained for

the transaction of business. Claims for sums withheld as retainages with respect to labor performed or materials furnished shall not be subject to the time limitations stated in this paragraph 3.

4. No suit or action shall be commenced hereunder by any claimant.
 - a. Unless brought within one year after the day on which the person bringing such action last performed labor or last furnished or supplied materials, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, the limitation embodied within this bond shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.
 - b. Other than in a Virginia court of competent jurisdiction, with venue as provided by statute, or in the United States District Court for the district in which the project, or any part thereof is situated.
5. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

Signed and sealed this _____ day of _____

Contractor / Principal

(SEAL)

Witness

By: _____

Typed Name: _____

Title: _____

Surety

(SEAL)

By: _____

Attorney-in-Fact

Typed Name: _____

AFFIDAVIT AND ACKNOWLEDGEMENT OF ATTORNEY-IN-FACT

COMMONWEALTH OF VIRGINIA
(or alternatively, Commonwealth or State of _____)

CITY of _____

I, the undersigned notary public, do certify that _____, whose name is signed to the foregoing labor and material payment bond in the sum of _____ and dated _____ and which names the Commonwealth of Virginia, _____, as Obligee, personally appeared before me today in the above jurisdiction and made oath that he/she is the attorney-in-fact of _____, a _____ corporation which is the Surety in the foregoing bond, that he/she is duly authorized to execute on the above Surety's behalf the foregoing bond pursuant to the Power of Attorney noted above and attached hereto, and on behalf of the surety, he/she acknowledged the foregoing bond before me as the above Surety's act and deed

She/he has further certified that her/his Power of Attorney has not been revoked.

[Complete if Power is recorded: Clerk's Office: _____;
Deed Book/Page No. or Instrument No.: _____.]

Given under my hand this _____ day of _____.

Notary Public

(SEAL)

My name (printed) is: _____

My registration number is: _____

My commission expires: _____

APPROVED:

Attorney General/Designee

Date

**COMMONWEALTH OF VIRGINIA
STANDARD BID BOND**

KNOW ALL MEN BY THESE PRESENTS: That _____, the Contractor ("Principal") whose principal place of business is located at _____ and _____ ("Surety") whose address for delivery of 'Notices' is located at _____ are held and firmly bound unto the Commonwealth of Virginia, _____, the Owner ("Obligee") in the amount of five percent (5%) of the Amount (Total Base Bid plus all Additive Bid Items) Bid by Principal, for the payment whereof, Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for _____

NOW, THEREFORE, the conditions of this obligation are as follows. This Bid Bond shall guarantee that the Principal will not withdraw his bid during the period of thirty (30) days following the opening of bids; that if his bid is accepted, Principal will enter into a formal contract with the Owner in accordance with the Contract Between Owner and Contractor, Form CO-9, included as a part of the Invitation for Bids (IFB Documents); that Principal will submit a properly executed and authorized Standard Performance Bond and Standard Labor and Material Payment Bond on the forms included in the IFB documents; and that in the event of the withdrawal of said bid within said period, or failure to enter into said contract and give said bonds within ten (10) days after Principal has received notice of acceptance of his bid, Principal and Surety shall be jointly and severally liable to the Owner for the difference between the amount specified in said bid and such larger amount for which the Owner may contract with another party to perform the work covered by said bid, up to the amount of the bid guarantee. This amount represents the damage to the Owner of account of the default of the bidder in any particular thereof.

The Surety represents to the Principal and to the Obligee that it is legally authorized to do business in the Commonwealth of Virginia.

Signed and sealed this _____ day of _____

Contractor / Principal

(SEAL)

Witness

By: _____

Typed Name: _____

Title: _____

Surety

(SEAL)

By: _____

Attorney-in-Fact

Typed Name: _____

AFFIDAVIT AND ACKNOWLEDGEMENT OF ATTORNEY-IN-FACT

COMMONWEALTH OF VIRGINIA
(or alternatively, Commonwealth or State of _____)

CITY of _____

I, the undersigned notary public, do certify that _____, whose name is signed to the foregoing bid bond in the amount of five percent (5%) of the Total Bid Amount and which names the Commonwealth of Virginia, _____, as Oblige, personally appeared before me today in the above jurisdiction and made oath that he/she is the attorney-in-fact of _____, a _____ corporation which is the Surety in the foregoing bond, that he/she is duly authorized to execute on the above Surety's behalf the foregoing bond pursuant to the Power of Attorney noted above and attached hereto, and on behalf of the surety, he/she acknowledged the foregoing bond before me as the above Surety's act and deed.

She/he has further certified that her/his Power of Attorney has not been revoked.

[Complete if Power is recorded: Clerk's Office: _____;

Deed Book/Page No. or Instrument No.: _____.]

Given under my hand this _____ day of _____.

Notary Public

(SEAL)

My name (printed) is: _____

My registration number is: _____

My commission expires: _____

<u>Project Code</u>	<u>Change Order Number</u>	<u>Change Order Date</u>
000 - 00000 - 000		#N/A

	<u>Code</u>	<u>Description</u>
Agency:	000	0
Project:	00000	0
Sub-Project:	000	

To: 0

Gentlemen:

Under your contract dated January 0, 1900 for work at

0

#

the Contract Price, in accordance with the Contract Documents, the sum of

#N/A

#VALUE!

#

#

(Failure to include a change for time shall waive any change to the time allowed by the Contract for completion of the Work unless the parties mutually agree in writing to postpone a determination of the change to time resulting from the Change Order. Such determination may not be postponed more than 45 days from the approval of this Change Order by the agency.)

CONTRACT COST SUMMARY

(inclusive of this Change Order)

Original Contract Amount	\$0.00
Cumulative Changes Orders	#N/A
Revised Contract Amount	#N/A

CONTRACT SCHEDULE SUMMARY

(inclusive of this Change Order)

Original Contract Completion Date:	January 0, 1900
Cumulative Schedule Extension:	#N/A
Revised Contract Completion Date:	#N/A

CHANGE AUTHORIZATION

Issued By:

Authorized A/E Representative_____
Date

Accepted By:

Authorized Contractor Representative_____
Date

Approved / Recommended By:

Authorized Agency Representative_____
Date

Prior approval by the Governor or his designee is required for each Change Order which causes an increase in the Contract Price if the resulting cumulative sum of all Change Orders exceeds **25% of the original Contract Amount or \$50,000, whichever is greater.**

#N/A

Recommended By:

Director, Division of Engineering and Buildings_____
Date

Approved By:

Director, Department of General Services_____
Date

(Rev. 07/09)

CO-11
Part 2

By" and "Reason for Change"

Change Order Number

Change Order Date

O

#N/A

#N/A

#N/A

Change Order Total (sum of the details listed below) = \$

\$

•

#N/A

#N/A

Reference
Number

Description

Initiated
By

Reason
Code

Amount

[illegible]

* - If an asterisk appears adjacent to an "Amount" entry, this indicates the "Initiated By" or "Reason for Change" field(s) have not been filled-in properly. Please enter the appropriate values in both of these fields.

DGS-30-104 (FORM CO-12) (Rev. 03/09)	SCHEDULE OF VALUES and CERTIFICATE FOR PAYMENT	PAYMENT REQUEST NO. 1	PERIOD BEGINNING DATE: 01/00/1900 PERIOD ENDING DATE: 01/00/1900
PART A SUMMARY AND CERTIFICATION			

PROJECT CODE: 0
AGENCY NAME: 0
PROJECT TITLE: 0

	TOTAL VALUE	VALUE OF WORK COMPLETED			PERCENT COMPLETE
		PREVIOUS VALUE TO DATE	VALUE THIS REPORT	CURRENT VALUE TO DATE	
	A	B	C	D = B + C	E = D / A
Original Contract Line Items (from CO-12, PART B)	\$ -	\$ -	\$ -	\$ -	0%
Approved Change Orders (from CO-12, PART C)	\$ -	\$ -	\$ -	\$ -	0%
ADJUSTED CONTRACT TOTAL	\$ -	\$ -	\$ -	\$ -	0%
Retainage <i>Retainage Percentage: 5.0%</i>		\$ -	\$ -	\$ -	
NET REQUISITION AMOUNT		\$ -	\$ -	\$ -	

Amount Requested

CONTRACTOR CERTIFICATION

The undersigned Contractor requests payment of that portion of the contract price shown on the last line of the foregoing Schedule of Values, and represents and warrants to the Owner that: (1) the data shown on the Schedule of Values is accurate and correct; (2) the Work covered by this Certificate has been completed in accordance with the Contract Documents; (3) all previous progress payments received from Owner on account of Work done under this Contract have been applied to discharge in full (except for allowable retainage) all obligations of Contractor incurred in connection with Work covered by prior Certificates for Payment (N/A for Payment No. 1) ; (4) title to all materials and equipment for which payment is requested in this Certificate, whether or not incorporated in said Work, will pass to Owner at time of payment free and clear of all liens, claims, security interests and encumbrances (except such materials and equipment which are covered by a Bond previously accepted by Owner).

FEIN #: 0

Date: January 0, 1900

Contractor:

By: _____

signature

Typed Name: 0

0

ARCHITECT/ENGINEER CERTIFICATION

This is to certify that, in accordance with the terms of a contract for Project Number _____ executed the day of _____, by and between, _____, the contractor, and the Commonwealth of Virginia, _____, the Owner, for work at _____, there is due to the Contractor the amount of _____
No Dollars and No Cents \$.00

Architect/Engineer:

By: _____

signature

printed name

date

AGENCY ACTION

Amount approved for payment this certificate is: _____

Dollars (_____)

By: _____

signature

title

date

By: _____

signature

title

date

DGS-30-104 (FORM CO-12)		SCHEDULE OF VALUES AND CERTIFICATE FOR PAYMENT		PAYMENT REQUEST NO.	1
(Rev. 03/09)		PROJECT CODE: 0.00			
PART B		AGENCY NAME: 0			
ORIGINAL CONTRACT LINE ITEMS		PROJECT TITLE: 0		PERIOD BEGINNING DATE: 01/00/1900	PERIOD ENDING DATE: 01/00/1900

DGS-30-104 (FORM CO-12) (Rev. 03/09)		SCHEDULE OF VALUES AND CERTIFICATE FOR PAYMENT		PAYMENT REQUEST NO.	1
PART C		PROJECT CODE: 0.00		PERIOD BEGINNING DATE: 01/00/1900	
CONSTRUCTION CHANGE ORDERS		AGENCY NAME: 0		PERIOD ENDING DATE: 01/00/1900	
		PROJECT TITLE: 0			

[illegible]

**COMMONWEALTH OF VIRGINIA
AFFIDAVIT OF PAYMENT OF CLAIMS**

By:

This day _____ personally appeared before me,
_____, a Notary Public in and for the City
(County) of _____, _____ and, being by me
first duly sworn, states that all subcontractors and suppliers of labor and materials have been paid all sums
due them for work performed or materials furnished in the performance of the Contract between the
Commonwealth of Virginia, _____
_____, Owner, and _____, Contractor,
dated _____, 20____, for the construction of

or arrangements have been made by the Contractor satisfactory to such subcontractors and suppliers with
respect to payments of such sums as may be due them by the Contractor.

Typed Contractor Name

By:

Signature

Typed Name & Title of Person Signing

Subscribed and sworn to before me this _____ day of _____, 20____. My commission
expires on the _____ day of _____, 20____.

Notary Public

**CERTIFICATE OF COMPLETION BY ARCHITECT/ENGINEER
or PROJECT MANAGER**

Date:

TO: Bureau of Capital Outlay Management
1100 Bank Street, 6th Floor
Richmond, Virginia 23219

PROJECT TITLE:
PROJECT NO:
INSTITUTION/AGENCY:
ADDRESS:

In accordance with the requirements of the Contract Between Owner and Architect / Engineer for Professional Services (Form CO-3) or the Contract Between Owner and Project Manager and based upon the knowledge gained in the performance of the services required in said Agreement, the undersigned hereby states that the above named project was fully completed in accordance with the requirements of the Contract Documents on _____.
(date)

All applicable tests, certificates and regulatory inspections required by the _____ edition of the Virginia Uniform Statewide Building Code, which was the basis of the design of the project, have been performed and the Owner has been provided with a copy of each report. A copy of the Final Report of Structural & Special Inspections (Form CO-13.1b) is attached to this certificate. All deficiencies noted during the inspection have been corrected or resolved.

The handicapped standards required by Chapter 7 of the applicable A/E Manual, as revised, have been met.

The Owner has been provided with a copy of all warranties and guarantees, including the starting date(s) of all warranties and guarantees, written and unwritten, required by the Contract Documents.

(Typed Firm Name)

By:

(Typed Name & Title)

Attachments:
Final Report of Structural & Special Inspections (Form CO-13.1b)

ARCHITECT/ENGINEER'S
CERTIFICATE OF SUBSTANTIAL COMPLETION

Date:

TO: Bureau of Capital Outlay Management
1100 Bank Street, 6th Floor
Richmond, Virginia 23219

PROJECT TITLE:

PROJECT NO:

INSTITUTION/AGENCY:

ADDRESS:

In accordance with the requirements of the Agreement between the Owner and the Architect / Engineer and based upon the knowledge gained in the performance of the architectural / engineering services provided in said Agreement and the reports of the Owner's Inspection and Testing entities, the undersigned Architect / Engineer states that the following portions of the project named above are substantially complete in accordance with the requirements of the Contract Documents and are recommended for occupancy: *(Indicate portions which are recommended for occupancy)*

All applicable tests, certificates and regulatory inspections required by the _____ edition of the Virginia Uniform Statewide Building Code, which was the basis of the design of the project, have been performed with respect to the substantially completed portions of the project and the Owner has been provided with a copy of each report, except for the following: _____

The handicapped standards required by Chapter 7 of the applicable A/E Manual, as revised, have been met. A copy of the Final Report of Structural & Special Inspections, Form CO-13.1b, is attached to this certificate.

A tentative list of unfinished Work and defective Work, referred to as the "punch list", is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

(Typed Name of Architect / Engineer)

By:

(Signature in ink)

(Typed Name & Title)

The following documents are attached to and made a part of this Certificate:

- Final Report of Structural & Special Inspections (Form CO-13.1b)
- Checklist for Beneficial Occupancy (Form CO-13.3b)
- Punch list containing page 1 through _____

FINAL REPORT OF STRUCTURAL & SPECIAL INSPECTIONS

INSTITUTION/AGENCY:

PROJECT TITLE:

PROJECT NO:

ARCHITECT/ENGINEER OF RECORD:

To the best of my information, knowledge, and belief, the Structural & Special Inspections required for this project, and itemized in the Form CO-6b, Special Inspections listing attached to the Form CO-6a, Statement of Structural and Special Inspections, submitted for permit, have been completed.

The discrepancies that remain outstanding since the last interim report dated _____, have been corrected or have been resolved as follows:

(Attach 8-1/2 x 11 continuation sheet(s) if required to complete the description of corrections or resolution of deviations)

Respectfully submitted,

Structural Engineer

Project Inspector

Signature Date

Signature Date

Type or print name

Type or print name

Agency Project Manager

Signature Date

Type or print name

CERTIFICATE OF COMPLETION BY CONTRACTOR

Date:

TO: Bureau of Capital Outlay Management
1100 Bank Street, 6th Floor
Richmond, Virginia 23219

PROJECT TITLE:

PROJECT NO:

INSTITUTION/AGENCY:

ADDRESS:

In accordance with the requirements of the Contract Between Owner and Contractor (Form CO-9), the undersigned Contractor hereby states that the above named project has been fully completed in accordance with the requirements of the Contract Documents as modified by approved change orders.

All applicable tests, certificates and regulatory inspections required by the Virginia Uniform Statewide Building Code and the Contract Documents have been performed with respect to the completed project and the Owner has been provided with a copy of each report.

As-built marked up prints of the completed project have been provided to the Architect/Engineer as required by the Contract Documents.

The Owner has been provided with a copy of all warranties and guarantees, including the starting date(s) of all warranties and guarantees, written and unwritten, required by the Contract Documents.

All training, operating instructions and maintenance manuals required by the Contract Documents have been provided to the Owner.

(Typed Contractor Name)

By:

(Typed Name & Title of Person Signing)

cc: Agency
A/E

CERTIFICATE OF PARTIAL OR SUBSTANTIAL COMPLETION BY CONTRACTOR

Date:

TO: Bureau of Capital Outlay Management
1100 Bank Street, 6th Floor
Richmond, Virginia 23219

PROJECT TITLE:**PROJECT NO:****INSTITUTION/AGENCY:****ADDRESS:**

In accordance with the requirements of the Agreement between the Owner and the Contractor, the undersigned Contractor hereby states that portions of the above named project are substantially completed in accordance with the requirements of the Contract Documents as modified by approved change orders. Those portions of the project now substantially complete are: *(list or describe)*

All applicable tests, certificates and regulatory inspections required by the Virginia Uniform Statewide Building Code and the Contract Documents have been performed with respect to the substantially completed portions of the project and the Owner has been provided with a copy of each report.

As-built marked up prints of the substantially completed portions of the project have been provided to the Architect/Engineer as required by the Contract Documents.

The Owner has been provided with a copy of all warranties and guarantees, including the starting date(s) of all warranties and guarantees, written and unwritten, required by the Contract Documents with respect to the completed portions of the project, except as follows:

All training, operating instructions and maintenance manuals required by the Contract Documents have been provided to the Owner, except as follows: *(list or describe)*

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

Typed Contractor Name

By:

Typed Name & Title

[illegible]

DGS-30-052

(Rev. 06/08)

2006 Code Version

Project Code: 260-17712

Project Title: Campus Renovations, Warsaw + Glenns, Virginia

VUSBC SPECIAL INSPECTIONS

(STATE OWNED BUILDINGS)

CO-6b

MATERIAL/ ACTIVITY	TYPE OF INSPECTION	REQ'D THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *			
				A/E	OWNER'S PROJ INSP	OWNER'S TEST LAB	CONTRACTOR / SUPPLIER
FOUNDATIONS							
Soil	Classify & Test Fill Materials	Y	Specs, 1704.7			X (Spot)	
Soil	Compaction Of Fill Materials	Y	Specs, 1704.7			X	
Soil	Bearing At Bottom Of Footing Excavations	Y	Specs, 1704.7			X (Spot)	
Soil/ Rock	Bottom Of Caissons	N	1810.7			X	
Piles	Driving Records, Tip & Cutoff Elevations	N	1704.8	4		X	
Piles	Load Test	N	Specs, 1808.2.8.3	4		X	
Reinf. Bars	Size & Placement In Foundations	Y	ACI, Specs	5	X	X (Spot)	
Piers	Size & Placement Of Reinf. Bars	Y	1704.9, 1812.4	5	X	X (Spot)	
CONCRETE CONSTRUCTION							
Concrete	Ready-Mix Plant Quality Control	Y	Specs, 1704.2	2			X, 1
Concrete	Mix Design Tests And Certificates	Y	Specs, 1704.4	X			X, 1
Reinf. Steel	Shop Drawings Of Reinforcing Steel	Y	Specs	X			
Reinf. Steel	Placement Of Reinforcing Steel	Y	1704.4	5	X	X (Spot)	
Reinf. Steel	Welding	N	1704.4	2		X	X, 1
Formwork	Design, Size, Placement & Shoring	N	1704.4		X	X (Spot)	X
Formwork	Removal And Reshoring	N	1704.4			X (Spot)	X
Concrete	Test Cylinders	Y	1704.4, 1905.6	4		X	
Concrete	Mix Proportions & Mix On Delivery Tickets	Y	1704.4		X (Spot)		
Concrete	Slump Test	Y	1704.4	4	X	X	
Concrete	Placement Procedures	Y	1704.4	5	X (Spot)	X	
Concrete	Curing Temperatures & Techniques	Y	1905.11		X		
Prestressed	Prestressing Procedures & Forces	N	1704.4	2		X	X, 1
Prestressed	Shop Drawings Of Prestressed Units	N	Specs	X			
Precast	Quality Control Of Manufacturer	N	1704.2	2			X, 1
Precast	Shop Drawings Of Precast	N	Specs	X			
Precast	Erection Of Precast	N	1704.4	5	X	X (Spot)	X
Precast	Inspection Of Connections	N	1704.4			X (Spot)	
Anchors	Anchors Cast In Concrete	Y	Specs, 1911.5			X	

(Rev. 06/08)

(STATE OWNED BUILDINGS)

2006 Code Version

Project Code: 260-17712

Project Title: Campus Renovations, Warsaw + Glens, Virginia

MATERIAL/ ACTIVITY	TYPE OF INSPECTION	REQ'D THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				A/E	OWNERS PROJ INSP	OWNERS TEST LAB	CONTRACTOR / SUPPLIER	
MASONRY CONSTRUCTION								
Quality Assurance	Indicate Level Of Quality Assurance Required (1, 2, or N/A)	1	1708.1					
Clay Masonry	Certificates, Tests & Technical Data	N	1708.1	X				3
Concrete Masonry	Certificates, Tests & Technical Data	Y	1708.1	X				3
Reinf. Steel	Shop Drawings	Y	Specs	X				
Reinf. Steel	Size, Grade, Type, Location, Spacing Of Reinf Steel	Y	1704.5			X (Spot)		
Anchors	Manufacturer's Data	Y	1704.5	X				3
Accessories	Manufacturer's Data	Y	Specs	X				3
Mortar & Grout	Mix Design And Data	Y	1704.5, 1708.1	X				
Masonry Strength	Masonry Strength Verified	Y	1708.1, 2105.2.2	2, 4			X	
Mortar & Grout	Field Samples And Testing, Placement	Y	1704.5	4	X (Spot)	X		
Foundations	Tolerance Inspection	Y	Specs	5	X			
Masonry	Placement Of Units, Mortar & Accessories	Y	1704.5	5	X			
Masonry	Protection Of Masonry Work	Y	1704.5	5	X			
Anchorage	Placement Of Devices	Y	1704.5	5	X			
STEEL CONSTRUCTION								
Fabricator	Quality Control Inspection Of Shop	Y	1704.2	2				X, 1
Fasteners	Mfr's Certificate Of Compliance	Y	1704.3	X				3
Struct. Steel	Mfr's Certificate Of Compliance	Y	1704.3	X				3
Weld Mat's	Manufacturer's Certificate Of Compliance	Y	1704.3	X				3
Details	Shop Drawings Review	Y	Specs	X				
Erection	Installation Of High-Strength Bolts	Y	1704.3.3				X	
Erection	Welding	Y	1704.3.1, 1707.2				X	
Erection	Steel Framing And Connections	Y	1704.3.2	5	X	X (Spot)		

* The numbers listed refer to notes on Page 5.

DGS-30-052

(Rev. 06/08)

2006 Code Version Project Code: 260-17712

Project Title: Campus Renovations, Warsaw + Glenns, Virginia

VUSBC SPECIAL INSPECTIONS

(STATE OWNED BUILDINGS)

CO-6b

MATERIAL/ ACTIVITY	TYPE OF INSPECTION	REQ'D THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *			
				A/E	OWNER'S PROJ INSP	OWNER'S TEST LAB	CONTRACTOR / SUPPLIER
ADDITIONAL SEISMIC INSPECTIONS							
(Note: SDC refers to Seismic Design Category.)							
Components	Storage Racks & Access Floors (SDC = D)	N	1707.6			X (Spot)	
Components	Architectural Exterior Cladding & Veneer (SDC = D)	N	1707.7			X (Spot)	
Components	Mechanical & Electrical - Anchorage (SDC = C)	N	1707.8, 1705.3			X	
Components	Suspended Ceilings-Anchorage (SDC = D)	N	1705.3			X (Spot)	
Components	Non-Bearing Masonry Partition Walls (SDC = D)	N	1707.7			X (Spot)	
SEISMIC FORCE RESISTING SYSTEMS (as required by VUSBC 1705.3 and 1707)							
Structural Steel	Welding	N	1707.2, 1708.4			X	
Light Gage Steel	Fastening	N	1707.4		X	X (Spot)	
Wood	Field Glueing	N	1707.3			X	
Wood	Fastening Of Seismic Force Resistance System	N	1707.3		X	X (Spot)	
Piers	Placement Of Reinforcing	N	1707.5		X	X (Spot)	
Piers	Concrete Placement	N	1707.5			X	
Masonry	Reinforcing Steel Test Reports	N	1708.2, 1708.3	2			X, 1
	(A/E add lines as needed to identify other required items)						
MAIN WINDFORCE-RESISTING SYSTEMS (as required by VUSBC 1705.4)							
Roof Diaphragm	Cladding & Framing Connections	N	1705.4.2		X	X (Spot)	
Diaphragm	Connections To Walls	N	1705.4.2		X	X (Spot)	
Diaphragm	Collectors, Struts, Boundary Elements	N	1705.4.2		X	X (Spot)	
Foundation	Connections To Foundation	N	1705.4.2		X	X (Spot)	
Vertical Elements	Shear Walls, Moment & Braced Frames	N	1705.4.2			X	
Glazing	Fabrication And Installation	N	1609.1.2	2	X	X (Spot)	X, 1
	(A/E add lines as needed to identify other required items)						

(Rev. 06/08)

(STATE OWNED BUILDINGS)

2006 Code Version

Project Code: 260-17712

Project Title: Campus Renovations, Warsaw + Glenns, Virginia

MATERIAL/ ACTIVITY	TYPE OF INSPECTION	REQ'D THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *				
				A/E	OWNER'S PROJ INSP	OWNER'S TEST LAB	CONTRACTOR / SUPPLIER	
WOOD & LIGHT GAGE STEEL CONSTRUCTION								
Fabrication	Quality Control Inspection Of Shop	N	1704.2	2				X, 1
Wood	Grade Stamp	N	Specs	5		X		
Wood/Light Gage	Fastening Per Code And Drawings	Y	Specs, 1704.6	5		X		
Trusses	Shop Drawings	N	Specs	X				
Trusses	Truss Placement & Fastening And Anchorage	N	Specs	5		X		
Laminates	Shop Drawings	N	Specs	X				
Laminates	Identification Per Shop Drawings	N	Specs	5		X		
Plywood	Grade Stamp, Thickness & Fastening	N	Specs, 1704.6.1	5		X		X
FIREPROOFING								
Spray-on	Manufacturer's Data	N	Specs	X				3
Spray-on	Surface Conditions	N	1704.10.1				X	
Spray-on	Application	N	1704.10.2				X	3
Spray-on	Thickness	N	1704.10.3				X	
Spray-on	Density	N	1704.10.4				X	
Spray-on	Bond Strength	N	1704.10.5				X	
Mastic/Intumescent	Fire-Resistant Coatings - Materials, Application	N	1704.11	X			X	3
GWB Fireproof	Manufacturer's Data	N	Specs	X				3
GWB Fireproof	Placement Of Materials	N	Specs			X		
Fire Wall Assembly	Manufacturer's Data	Y	Specs, 705.2	X				3
Fire Wall Assembly	Placement Of Materials	Y	Specs, 705.2			X		
EXTERIOR INSULATION & FINISH SYSTEMS (EIFS)								
Materials	Manufacturer's Data	Y	Specs	X				3
Preparation	Condition Of Substrate	Y	Specs	5		X		
Application	Methods, Proportions & Thickness Of Installation	Y	Specs, 1704.12	5		X	X (Spot)	

VUSBC SPECIAL INSPECTIONS

(STATE OWNED BUILDINGS)

MATERIAL/ ACTIVITY	TYPE OF INSPECTION	REQ'D THIS PROJ ?	REFERENCE	INSPECTION / TEST BY *			
				A/E	OWNER'S PROJ INSP	OWNER'S TEST LAB	CONTRACTOR / SUPPLIER
SMOKE CONTROL							
Ducts	Device Location And Air Duct Leakage	N	1704.14			X, 7	
System	Pressure Difference, Flow Measurements & Detection Testing	N	1704.14			X, 7	
Controls	Activation Sequence	N	1704.14			X, 7	

NOTES:

1. Fabricator, supplier, ready-mixed plant or other production plant shall provide certificates from an approved independent inspection, testing or quality assurance agency attesting that the plant meets at least one of the following criteria:
 - a. The plant is a certified production plant meeting the quality assurance standards of a recognized national standards organization for that product.
 - b. The plant maintains an agreement with an independent inspection or quality assurance agency to conduct periodic in-plant quality assurance inspections. The frequency of these inspections shall not be less than one every six months.
 - c. The plant has an in-shop quality assurance inspection program by an independent testing or quality assurance agency for the work/product to be provided on this project.
2. A/E shall review fabricator/supplier/producer certificates for conformance with appropriate standards of practice and quality assurance.
3. Contractor/supplier shall submit manufacturer's certificates of compliance for the materials/products.
4. Reviews records and test results for conformance with requirements.
5. Observes placement and erection of materials during jobsite visits.
6. Unless noted otherwise, the reference numbers listed refer to the 2006 VUSBC.
7. Special Inspection firm shall have expertise in fire protection engineering, mechanical engineering, and certification as an air balancer.

SECTION 00015

LIST OF DRAWINGS

VOLUME 1

TITLE SHEET / GENERAL INFO

T-1	DRAWING INDEX & CODE INFO
T-2	LOCATION & VICINITY MAPS, SYMBOLS & ABBREVIATIONS

CIVIL

U-1.1	SITE PLAN AND WATERLINE PROFILE
U-1.2	TANK AND WATERLINE DETAILS
U-1.3	NOTES AND DETAILS
U-1.4	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS

STRUCTURAL

S-1.0	GENERAL STRUCTURAL NOTES
S-1.1G	FOUNDATION PLAN -GLENNS CAMPUS
S-1.1W	FOUNDATION PLAN -WARSAW CAMPUS
S-2.1G	ROOF FRAMING PLAN -GLENNS CAMPUS
S-2.1W	ROOF FRAMING PLAN -WARSAW CAMPUS
S-3.1	TYPICAL FOUNDATION SECTIONS & DETAILS
S-4.1	TYPICAL ROOF FRAMING SECTIONS & DETAILS
S-4.2	ROOF FRAMING SECTIONS & DETAILS
S-4.3	EXISTING JOINT REINFORCEMENT SECTIONS & DETAILS

DEMOLITION

D-1G	DEMOLITION PLAN -GLENNS CAMPUS
D-1W	DEMOLITION PLAN -WARSAW CAMPUS
D-2G	DEMOLITION ELEVATIONS -GLENNS CAMPUS
D-2W	DEMOLITION ELEVATIONS -WARSAW CAMPUS

ARCHITECTURAL

AC-1G	ARCHITECTURAL SITE PLAN -GLENNS CAMPUS
AC-1W	ARCHITECTURAL SITE PLAN -WARSAW CAMPUS

AC-2G	ARCHITECTURAL SITE PHASE PLANS -GLENNS CAMPUS
AC-2W	ARCHITECTURAL SITE PHASE PLANS -WARSAW CAMPUS
A-0G	PHASING PLANS -GLENNS CAMPUS
A-0W	PHASING PLANS -WARSAW CAMPUS
A-0.1G	TEMPORARY CONSTRUCTION BARRIER PHASING PLANS -GLENNS CAMPUS
A-0.1W	TEMPORARY CONSTRUCTION BARRIER PHASING PLANS -WARSAW CAMPUS
A-1G	FLOOR PLAN -GLENNS CAMPUS
A-1W	FLOOR PLAN -WARSAW CAMPUS
A-1.1G	ROOF PLAN -GLENNS CAMPUS
A-1.1W	ROOF PLAN -WARSAW CAMPUS
A-2G	ENLARGED PLAN -GLENNS CAMPUS
A-2W	ENLARGED PLAN -WARSAW CAMPUS
A-3G	ENLARGED PLAN -GLENNS CAMPUS
A-3W	ENLARGED PLAN -WARSAW CAMPUS
A-4G	ENLARGED PLAN -GLENNS CAMPUS
A-4W	ENLARGED PLAN -WARSAW CAMPUS
A-5G	ENLARGED PLAN -GLENNS CAMPUS
A-5W	ENLARGED PLAN -WARSAW CAMPUS
A-6G	REFLECTED CEILING PLAN -GLENNS CAMPUS
A-6W	REFLECTED CEILING PLAN -WARSAW CAMPUS
A-7G	ENLARGED REFLECTED CEILING PLAN -GLENNS CAMPUS
A-7W	ENLARGED REFLECTED CEILING PLAN -WARSAW CAMPUS
A-8G	ENLARGED REFLECTED CEILING PLAN -GLENNS CAMPUS
A-8W	ENLARGED REFLECTED CEILING PLAN -WARSAW CAMPUS
A-9G	ENLARGED REFLECTED CEILING PLAN -GLENNS CAMPUS
A-9W	ENLARGED REFLECTED CEILING PLAN -WARSAW CAMPUS
A-10G	ENLARGED REFLECTED CEILING PLAN -GLENNS CAMPUS
A-10W	ENLARGED REFLECTED CEILING PLAN -WARSAW CAMPUS
A-11G	BUILDING ELEVATIONS -GLENNS CAMPUS
A-11W	BUILDING ELEVATIONS -WARSAW CAMPUS
A-12G	BUILDING SECTIONS -GLENNS CAMPUS
A-12W	BUILDING SECTIONS -WARSAW CAMPUS
A-13G	ENTRANCE DETAILS -GLENNS CAMPUS
A-13W	ENTRANCE DETAILS -WARSAW CAMPUS

A-14	PARTITION TYPES
A-15	PLAN DETAILS
A-16G	ENLARGED "EGG" PLAN -GLENNS CAMPUS
A-16W	ENLARGED "EGG" PLAN -WARSAW CAMPUS
A-17G	ENLARGED FLOOR PLAN -GLENNS CAMPUS
A-17W	ENLARGED FLOOR PLAN -WARSAW CAMPUS
A-18	PARTIAL BUILDING AND WALL SECTIONS
A-18.1	PARTIAL BUILDING SECTION
A-19	SECTION DETAILS & INTERIOR ELEVATION
A-21	DOOR SCHEDULE, TYPES & DETAILS
A-22	WINDOW TYPES & DETAILS
A-23	ENLARGED TOILET PLAN AND ELEVATIONS
A-24	ENLARGED TOILET PLAN AND ELEVATIONS
A-27	ENLARGED RAMP PLAN SECTIONS & DETAILS -WARSAW CAMPUS
A-28G	ROOM NUMBERING PLAN -GLENNS CAMPUS
A-28W	ROOM NUMBERING PLAN -WARSAW CAMPUS

INTERIOR DESIGN

ID-1.1G	GLENNS CAMPUS -FURNITURE PLAN
ID-1.1W	WARSAW CAMPUS -FURNITURE PLAN
ID-2.1G	GLENNS CAMPUS -FINISH SCHEDULE AND NOTES
ID-2.1W	WARSAW CAMPUS -FINISH SCHEDULE AND NOTES
ID-2.2	GLENNS & WARSAW CAMPUSES -BASIS OF DESIGN FINISHES
ID-2.3G	GLENNS CAMPUS -AREA DETAIL PLAN
ID-2.3W	WARSAW CAMPUS -AREA DETAIL PLAN
ID-2.4G	GLENNS CAMPUS -AREA "A" FLOOR PATTERN PLAN
ID-2.4W	WARSAW CAMPUS -AREA "A" FLOOR PATTERN PLAN
ID-2.5G	GLENNS CAMPUS -AREA "A" PAINT FINISH PLAN
ID-2.5W	WARSAW CAMPUS -AREA "A" PAINT FINISH PLAN
ID-2.6G	GLENNS CAMPUS -AREA "B" & "C" FLOOR PATTERN PLANS
ID-2.6W	WARSAW CAMPUS -AREA "B" & "C" FLOOR PATTERN PLANS
ID-2.7G	GLENNS CAMPUS -AREA "B" & "C" PAINT FINISH PLANS
ID-2.7G	GLENNS CAMPUS -AREA "B" & "C" PAINT FINISH PLANS
ID-2.7W	WARSAW CAMPUS -AREA "B" & "C" PAINT FINISH PLANS

ID-2.8G	GLENNS CAMPUS -AREA "D" FLOOR PATTERN PLAN
ID-2.8W	WARSAW CAMPUS -AREA "D" FLOOR PATTERN PLAN
ID-2.9G	GLENNS CAMPUS -AREA "D" PAINT FINISH PLAN
ID-2.9W	WARSAW CAMPUS -AREA "D" PAINT FINISH PLAN
ID-2.10	GLENNS & WARSAW CAMPUSES -DETAILED WALL ELEVATIONS & RESTROOM FLOOR DETAILS
ID-3.1	GLENNS & WARSAW CAMPUSES -DETAILED WALL ELEVATIONS
ID-4.1	GLENNS & WARSAW CAMPUSES -RECEPTION DESK -ISOMETRIC DETAIL, ELEVATIONS & DETAILS
ID-4.2	GLENNS & WARSAW CAMPUSES -CASEWORK ELEVATIONS & DETAILS
ID-4.3	WARSAW CAMPUS -CASEWORK ELEVATIONS & DETAILS

FIRE PROTECTION

FPI-1G	FIRE PROTECTION INFORMATION -GLENNS CAMPUS
FPI-1W	FIRE PROTECTION INFORMATION -WARSAW CAMPUS
FPI-2	FIRE PROTECTION INFORMATION
SP0.1	FIRE PROTECTION GENERAL NOTES, LEGEND, DETAILS & SCHEDULE
SP1.1G	FIRE PROTECTION PLAN - GLENNS CAMPUS
SP1.1W	FIRE PROTECTION PLAN = WARSAW CAMPUS
SP2.1G	FIRE PROTECTION SITE PLAN AND BUILDING SECTION - GLENNS CAMPUS
SP2.1W	FIRE PROTECTION SITE PLAN AND BUILDING SECTION - WARSAW CAMPUS

ABATEMENT

AB-1G	ABATEMENT PLAN AND NOTES -GLENNS CAMPUS
AB-1W	ABATEMENT PLAN AND NOTES -WARSAW CAMPUS

VOLUME 2

PLUMBING

P0.1GW	GLENNS AND WARSAW PLUMBING GENERAL NOTES, LEGEND, SCHEDULES AND ABBREVIATIONS
P0.2GW	GLENNS AND WARSAW CAMPUS PLUMBING FIXTURE PLATES
P0.3GW	GLENNS AND WARSAW CAMPUS PLUMBING FIXTURE PLATES
PD1.2G	GLENNS CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.2W	WARSAW CAMPUS PLUMBING DEMOLITION FLOOR PLAN

PD1.3G	GLENNS CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.3W	WARSAW CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.4G	GLENNS CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.4W	WARSAW CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.5G	GLENNS CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.5W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - PLUMBING
PD1.6G	GLENNS CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.6W	WARSAW CAMPUS PLUMBING DEMOLITION FLOOR PLAN
PD1.7G	GLENNS CAMPUS PLUMBING DEMOLITION ENLARGED PLAN
PD1.7W	WARSAW CAMPUS PLUMBING ENLARGED DEMOLITION PLAN
P1.2G	GLENNS CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.2W	WARSAW CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.3G	GLENNS CAMPUS PLUMBING NEW WORK PLAN
P1.3W	WARSAW CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.4G	GLENNS CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.4W	WARSAW CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.5G	GLENNS CAMPUS PLUMBING NEW WORK FLOOR PLANS
P1.5W	WARSAW CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.6G	GLENNS CAMPUS PLUMBING NEW WORK PLAN
P1.6W	WARSAW CAMPUS PLUMBING NEW WORK FLOOR PLAN
P1.7G	GLENNS CAMPUS PLUMBING NEW WORK ENLARGED PLANS
P1.7W	WARSAW CAMPUS PLUMBING NEW WORK ENLARGED PLANS
P6.1G	GLENNS CAMPUS PLUMBING WATER AND WASTE RISERS
P6.1W	WARSAW CAMPUS PLUMBING RISER DIAGRAM
P6.2G	GLENNS CAMPUS WATER AND PROPANE GAS RISER DIAGRAMS
P6.2W	WARSAW CAMPUS WATER AND PROPANE GAS RISER DIAGRAMS
P6.3G	GLENNS CAMPUS PLUMBING LAB WASTE RISERS DIAGRAMS
P6.3W	WARSAW CAMPUS PLUMBING LAB WASTE RISERS DIAGRAMS

MECHANICAL

M0.1	GLENNS AND WARSAW MECHANICAL GENERAL NOTES, LEGEND & ABBREVIATIONS
MD1.2G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.2W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.3G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK

MD1.3W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.4G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.4W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.5G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.5W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.6G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD1.6W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL DUCTWORK
MD2.2G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.2W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.3G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.3W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.4G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.4W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.5G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.5W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.6G	GLENNS CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
MD2.6W	WARSAW CAMPUS DEMOLITION FLOOR PLAN - MECHANICAL PIPING
M1.2G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.2W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.3G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.3W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.4G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.4W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.5G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.5W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.6G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.6W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL DUCTWORK
M1.7G	GLENNS CAMPUS MECHANICAL NEW WORK ROOF PLAN
M1.7W	WARSAW CAMPUS MECHANICAL NEW WORK ROOF PLAN
M2.2G	GLENNS CAMPUS MECHANICAL FLOOR PLAN - MECHANICAL PIPING
M2.2W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.3G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.3W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.4G	GLENNS CAMPUS MECHANICAL FLOOR PLAN - MECHANICAL PIPING

M2.4W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.5G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.5W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.6G	GLENNS CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M2.6W	WARSAW CAMPUS NEW WORK FLOOR PLAN - MECHANICAL PIPING
M5.1G	GLENNS CAMPUS MECHANICAL SCHEDULES
M5.1W	WARSAW CAMPUS MECHANICAL SCHEDULES
M6.1	GLENNS AND WARSAW CAMPUS MECHANICAL DETAILS
M6.2	GLENNS AND WARSAW CAMPUS MECHANICAL DETAILS
M7.1G	GLENNS CAMPUS MECHANICAL CONTROLS
M7.1W	WARSAW CAMPUS MECHANICAL CONTROLS

ELECTRICAL

E-01 GLENNS CAMPUS ELECTRICAL LEND, ABBREVIATIONS AND
NOTES

ED-1G	GLENNS DEMOLITION FLOOR PLAN - ELECTRICAL
ED-1W	WARSAW CAMPUS DEMOLITION FLOOR PLAN ELECTRICAL
E1.2G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.2W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.3G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.3W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.4G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.4W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.5G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E1.5W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL LIGHTING
E2.1G	GLENNS CAMPUS NEW WORK ROOF PLAN - ELECTRICAL
E2.1W	WARSAW CAMPUS NEW WORK ROOF PLAN - ELECTRICAL
E2.2G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL POWER
E2.2W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL POWER AND SPECIAL SYSTEMS
E2.3G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL POWER
E2.3W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL POWER
E2.4G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL POWER
E2.4W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL POWER
E2.5G	GLENNS CAMPUS FLOOR PLAN - ELECTRICAL POWER

E2.5W	WARSAW CAMPUS FLOOR PLAN - ELECTRICAL POWER AND SPECIAL SYSTEMS
E3.1G	GLENNS CABLE TRAY AND ACCESS CONTROL FLOOR PLAN - SPECIAL SYSTEMS
E3.1W	WARSAW CAMPUS CABLE TRAY AND ACCESS CONTROL FLOOR PLAN - SPECIAL SYSTEMS
E3.2G	GLENNS CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E3.2W	WARSAW CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E3.3G	GLENNS CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E3.3W	WARSAW CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E3.4G	GLENNS CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E3.4W	WARSAW CAMPUS FLOOR PLAN - SPECIAL SYSTESMS
E3.5G	GLENNS CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E3.5W	WARSAW CAMPUS FLOOR PLAN - SPECIAL SYSTEMS
E-4.1	RAPPAHANNOCKCOMMUNITY COLLEGE ELECTRICAL LIGHTING DETAILS
E-4.2	RAPPAHANNOCKCOMMUNITY COLLEGE ELECTRICAL LIGHTING DETAILS
E-4.3	RAPPAHANNOCKCOMMUNITY COLLEGE ELECTRICAL LIGHTING DETAILS
E-4.4	RAPPAHANNOCKCOMMUNITY COLLEGE SPECIAL SYSTEM DETAILS AND DIAGRAMS
E5.1G	GLENNS CAMPUS ELECTRICAL POWER RISER DIAGRAMS
E5.1W	WARSAW CAMPUS ELECTRICAL POWER RISER DIAGRAMS - DEMOLITION
E5.2G	GLENNS CAMPUS ELECTRICAL POWER RISER DIAGRAMS
E5.2W	WARSAW CAMPUS ELECTRICAL POWER RISER DIAGRAM
E6.1G	GLENNS CAMPUS ELECTRICAL PANELBOARD SCHEDULES
E6.1W	WARSAW CAMPUS ELECTRICAL PANELBOARD SCHEDULES
E6.2G	GLENNS CAMPUS ELECTRICAL PANELBOARD SCHEDULES
E6.2W	WARSAW CAMPUS ELECTRICAL PANELBOARD SCHEDULES
LABORATORY	
Q-0.1G	CASWORK TYPES -GLENNS CAMPUS
Q-0.1W	CASEWORK TYPES -WARSAW CAMPUS
Q-0.2G	LEGEND, ABBREVIATIONS & GENERAL NOTES -GLENNS CAMPUS
Q-0.2W	LEGEND, ABBREVIATIONS & GENERAL NOTES -WARSAW CAMPUS
Q-11G	LAB FLOOR PLAN -GLENNS CAMPUS
Q-11W	LAB FLOOR PLAN -WARSAW CAMPUS
Q-21G	ENLARGED LAB FLOOR PLAN -GLENNS CAMPUS

Q-21W	ENLARGED LAB FLOOR PLAN -WARSAW CAMPUS
Q-22G	ENLARGED LAB FLOOR PLAN -GLENNS CAMPUS
Q-22W	ENLARGED LAB FLOOR PLAN -WARSAW CAMPUS
Q-31G	INTERIOR LAB ELEVATIONS -GLENNS CAMPUS
Q-31W	INTERIOR LAB ELEVATIONS -WARSAW CAMPUS
Q-32G	INTERIOR LAB ELEVATIONS -GLENNS CAMPUS
Q-32W	INTERIOR LAB ELEVATIONS -WARSAW CAMPUS
Q-33G	INTERIOR LAB ELEVATIONS -GLENNS CAMPUS
Q-33W	INTERIOR LAB ELEVATIONS -WARSAW CAMPUS
Q-41G	WOOD CASEWORK DETAILS
Q-42G	WOODCASEWORK DETAILS
Q-43G	ADA WORKSTATION & EMERGENCY SHOWER DETAILS
Q-44G	HORIZONTAL HEADWALL & SHELF TYPE R01
Q-45G	PRE-WIRED TABLES DETAILS

END OF LIST OF DRAWINGS

SECTION 01100

SUMMARY

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Rappahannock Community College Campus Renovations.
- B. Owner's Name: Virginia Community College System; known hereafter as VCCS.
- C. Architect's Name: nbj Architecture.
- D. The Project consists of the alteration of the Glenns and Warsaw Cmapuses.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in General Conditions of the Construction Contract (CO-7).

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is shown on drawings.
- B. Scope of alterations work is shown on drawings.
- C. Renovate the following areas, complete including operational mechanical and electrical work and finishes:
 - 1. Glenns Campus: 32,891 s.f. of the existing 56,480 s.f. main building including classrooms, laboratories, administrative spaces, student lounge, and support spaces.
 - 2. Warsaw Campus: 32,974 s.f. of the existing 52,985 s.f. main building including classrooms, laboratories, administrative spaces, student lounge, and support spaces.
- D. Plumbing: Alter existing system and add new construction, keeping existing in operation for the other phase.
- E. HVAC: Alter existing system and add new construction, keeping existing in operation for the other phase.
- F. Electrical Power and Lighting: Alter existing system and add new construction, keeping existing in operation for the other phase.
- G. Fire Suppression Sprinklers: Provide and install new fire suppression system, including new storage tank at the Glenns Campus.
- H. Fire Alarm: Alter existing system and add new construction, keeping existing in operation for the other phase.
- I. Telephone/Data: Provide pathways and boxes.
- J. Roof: Provide and install skylights.
- K. Exterior: Provide and Install new entrance canopy at both campuses. Provide and install new handicap ramp/stair combination at the Warsaw Campus. Provide and install underground utilities as indicated for coordination .

1.04 WORK BY OWNER

- A. Items noted NIC (Not in Contract) will be supplied and installed by VCCS before Substantial Completion. Some items include:
 - 1. Movable cabinets.
 - 2. Furnishings.

3. Small equipment.
4. Artwork.
5. Telephone/Data cable, faceplates, and hubs.
6. Ceiling mounted projectors.

1.05 OWNER OCCUPANCY

- A. VCCS intends to continue to occupy adjacent portions of the existing building during the entire construction period.
- B. VCCS intends to occupy the Project upon Substantial Completion.
- C. Cooperate with VCCS to minimize conflict and to facilitate VCCS's operations.
- D. Schedule the Work to accommodate VCCS occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. Arrange use of site and premises to allow:
 1. VCCS occupancy of non-active phase.
 2. Work by VCCS.
 3. Use of site and premises by the public.
- B. Provide access to and from site as required by law and by VCCS:
 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Time Restrictions:
 1. Limit conduct of especially noisy and malodorous exterior work to non-class hours.
 2. Limit conduct of especially noisy interior work to non-class hours.
- D. Utility Outages and Shutdown:
 1. Limit disruption of utility services to hours the building is unoccupied.
 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to VCCS and authorities having jurisdiction.
 3. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE

- A. Construct Work in phases during the construction period:
 1. Phase 1: Administrative areas, student lounge, support spaces, new entry canopy at both campuses, ramp/stair at Warsaw, fire suppression storage tank at Glens.
 2. Phase 2: Classrooms and laboratories at both campuses.
- B. Work is to proceed simultaneously at both campuses.
- C. Coordinate construction schedule and operations with VCCS.

END OF SECTION

SECTION 01300

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Construction progress schedule.
- D. Progress photographs.
- E. Coordination drawings.
- F. Submittals for review, information, and project closeout.
- G. Number of copies of submittals.
- H. Submittal procedures.

1.02 RELATED REQUIREMENTS

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. VCCS will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. VCCS.
 - 2. nbj Architecture.
 - 3. General Contractor
 - 4. Major design team consultant.
 - 5. Major subcontractors.
- C. Agenda:
 - 1. Execution of VCCS- Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties to Contract, General Contractor, and nbj Architecture.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling.

3.02 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum semi-monthly intervals.
- B. nbj Architecture will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Project manager, Job superintendent, major Subcontractors and suppliers, VCCS, nbj Architecture, as appropriate to agenda topics for each meeting.

- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of Work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Maintenance of progress schedule.
 7. Corrective measures to regain projected schedules.
 8. Planned progress during succeeding work period.
 9. Maintenance of quality and work standards.
 10. Effect of proposed changes on progress schedule and coordination.
 11. Other business relating to Work.
- E. nbj Architecture will record minutes and distribute copies within 5 business days after meeting to participants, with copies to VCCS, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 14 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 5 days.
- C. Within 60 days after date of the Agreement, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

3.04 PROGRESS PHOTOGRAPHS

- A. Submit new photographs at least once a month, within 3 days after exposure.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of Work produced by an experienced photographer, acceptable to nbj Architecture.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
1. Foundations in progress and upon completion.
 2. Structural framing in progress and upon completion.
 3. Final completion, minimum of ten (10) photos.
- E. Views:
1. Consult with nbj Architecture for instructions on views required.
 2. Provide factual presentation.
 3. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
 2. File Naming: Include project identification, date and time of view, and view identification.
 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

3.05 COORDINATION DRAWINGS

- A. The General Contractor is to provide above-ceiling coordination drawings for review prior to commencement of major above-ceiling installations. At a minimum, the coordination drawings are to include mechanical ductwork, plumbing, lighting, and sprinkler lines and heads.

3.06 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to nbj Architecture for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01780 - CLOSEOUT SUBMITTALS.

3.07 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for nbj Architecture's knowledge as contract administrator or for VCCS.

3.08 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
 - 5. Other types as indicated.
- B. Submit for VCCS's benefit during and after project completion.

3.09 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review:
 - 1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that the Contractor requires, plus two copies that will be retained by nbj Architecture and VCCS.
 - 2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit the number of opaque reproductions that the Contractor requires, plus two copies that will be retained by nbj Architecture and VCCS.
- B. Documents for Information: Submit three.
- C. Samples: Submit three; one of which will be retained by nbj Architecture.

3.10 SUBMITTAL PROCEDURES

- A. Transmit each submittal with approved form.

- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Project Code, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- D. Apply Contractor's stamp, as shown in the CO-7, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- E. Deliver submittals to nbj Architecture at business address.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 10 business days excluding delivery time to and from the architect.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Provide space for associated engineer and nbj Architecture review stamps.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01400

QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mock-ups.
- B. Control of installation.
- C. Tolerances.
- D. Testing and inspection services.
- E. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

- A. Section 01300 - Administrative Requirements: Submittal procedures.
- B. Section 01422 - Definitions.
- C. Section 01425 - Reference Standards.

1.03 TESTING AND INSPECTION AGENCIES

- A. VCCS will employ and pay for services of an independent testing agency to perform specified (Form CO-6b) testing.
- B. Retesting required by deficient test results shall be at the Contractor's expense.

PART 3 EXECUTION

2.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from nbj Architecture before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by nbj Architecture and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

2.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from nbj Architecture before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

2.04 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with nbj Architecture and in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify nbj Architecture and of observed irregularities or non-conformance of Work or products.
 - 5. Perform additional tests and inspections required by nbj Architecture.
 - 6. Submit reports of all tests/inspections specified.
 - 7. Provide independent inspection by an approved, independent special inspector and certification for compliance with ASTM C 635, ASTM C 636, and the manufacturer's installation instructions for both the ceiling grid and sprinkler connections.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of.
 - 4. Agency has no authority to stop the Work.
- C. Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify nbj Architecture and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by beyond specified requirements.
 - 6. Arrange with VCCS's agency and pay for additional samples, tests, and inspections required by beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by nbj Architecture.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by.

2.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

2.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of nbj Architecture, it is not practical to remove and replace the Work, VCCS will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01410

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Regulatory requirements applicable to this project are the following:
- B. ATBCB ADAAG - Americans with Disabilities Act Accessibility Guidelines; July 23, 2004.
- C. 29 CFR 1910 - Occupational Safety and Health Standards; current edition; as a work place.
- D. The Virginia Rehabilitation Code; referencing the following.
- E. ICC (IFC) - ICC International Fire Code, 2006.
- F. ICC (IBC) - ICC International Building Code, 2006.
- G. ICC (IPC) - ICC International Plumbing Code, 2006.
- H. ICC (IMC) - ICC International Mechanical Code, 2006.
- I. ICC (IFGC) - ICC International Fuel Gas Code, 2006.
- J. NFPA 70 - National Electrical Code, 2005.
- K. ICC (IECC) - ICC International Energy Conservation Code, 2006.

1.02 RELATED REQUIREMENTS

- A. Section 01400 - Quality Requirements.

1.03 QUALITY ASSURANCE

- A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract provide the direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Glenss and Warsaw, Virginia.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01422

DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the definitions contained in the General Conditions of the Construction Contract (CO-7).
- B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Project Manuals: The book-sized volumes that include the procurement requirements (if any), the contracting requirements, and the specifications.
- E. Provide: To furnish and install.
- F. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers and enclosures.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.

1.02 RELATED REQUIREMENTS

- A. Section 01525 - Field Offices.
- B. Section 01585 - Project Signs.

1.03 TEMPORARY UTILITIES

- A. VCCS will provide the following:
 - 1. Electrical power, consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.
- B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field offices at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Internet Connections: Minimum of one per site; Cable modem or faster.
 - 2. Facsimile Service: Minimum of one dedicated fax machine/printer per site, with dedicated phone line.

1.05 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 EXTERIOR ENCLOSURES

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.08 INTERIOR ENCLOSURES

- A. Provide temporary partitions and ceilings as indicated to separate work areas from VCCS-occupied areas, to prevent penetration of dust and moisture into VCCS-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:
 - 1. Fire rating of one hour.
 - 2. STC rating of 35 in accordance with ASTM E 90.
- C. Paint surfaces exposed to view from VCCS-occupied areas.

1.09 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and VCCS's operations from unauthorized entry, vandalism, or theft.

1.10 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and VCCS.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Designated existing on-site roads may be used for construction traffic.
- E. Existing parking areas located at Glenns and Warsaw may be used for construction parking.

1.11 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.12 PROJECT SIGNS - See Section 01585

1.13 FIELD OFFICES - See Section 01525

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01525

FIELD OFFICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary field offices for use of the Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 01500 - Temporary Facilities and Controls:
 - 1. Temporary telecommunications services for administrative purposes.
 - 2. Temporary sanitary facilities required by law.

1.03 USE OF EXISTING FACILITIES

- A. Existing facilities shall not be used for field offices.

1.04 USE OF PERMANENT FACILITIES

- A. Permanent facilities shall not be used for field offices.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

- A. Materials, Equipment, Furnishings: Serviceable, new or used, adequate for required purpose.

2.02 CONSTRUCTION

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.

2.03 ENVIRONMENTAL CONTROL

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

2.04 OFFICE AND FACILITIES

- A. Quantity: Provide one field office at each site.
- B. Size: For's needs and to provide space for project meetings.
- C. Telephone: As specified in Section 01500.
- D. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.
- E. Other Furnishings: Contractor's option.
- F. Equipment: Six adjustable band protective helmets for visitors, one 10 inch outdoor weather thermometer.

2.05 OWNER AND ARCHITECT/ENGINEER OFFICE

PART 3 EXECUTION

3.01 PREPARATION

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

3.02 INSTALLATION

- A. Employee Residential Occupancy: Not allowed on VCCS's property.

3.03 MAINTENANCE AND CLEANING

- A. Maintain approach walks free of mud, water, and snow.

3.04 REMOVAL

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

END OF SECTION

SECTION 01585

PROJECT SIGNS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project identification sign.
- B. Project informational signs.

1.02 QUALITY ASSURANCE

- A. Design sign and structure to withstand 50 miles/hr wind velocity.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: New, wood, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch thick, standard large sizes to minimize joints.
- C. Rough Hardware: Galvanized.
- D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.

2.02 PROJECT IDENTIFICATION SIGN

- A. One painted sign, 48 sq ft area, bottom 4 feet above ground at each site.
- B. Content:
 - 1. Project number, title, logo and name of VCCS as indicated on Contract Documents.
 - 2. Names and titles of nbj Architecture and Consultants.
 - 3. Name of Prime and major Subcontractors.
- C. Lettering: Standard Alphabet Series C, as specified in FHWA Standard Highway Signs (SHS).

2.03 PROJECT INFORMATIONAL SIGNS

- A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot distance.
- B. Provide at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
- B. Erect at designated location.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

- A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

SECTION 01600

PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Procedures for VCCS-supplied products.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 01400 - Quality Requirements: Product quality monitoring.

1.03 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the VCCS, or otherwise indicated as to remain the property of the VCCS, are to be removed from the site and properly disposed of.
- C. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming Three or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

- C. Products Specified by Naming Three or More Manufacturers with a Provision for Substitutions:
Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- C. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to VCCS.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- D. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The nbj Architecture will notify in writing of decision to accept or reject request.

3.02 OWNER-SUPPLIED PRODUCTS

- A. See Section 01100 - Summary for identification of VCCS-supplied products.
- B. VCCS's Responsibilities:
 - 1. Arrange and pay for product delivery to site.
 - 2. On delivery, inspect products jointly with the resident inspector.
 - 3. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 4. Arrange for manufacturers' warranties, inspections, and service.
- C. Contractor's Responsibilities:
 - 1. Review VCCS reviewed shop drawings, product data, and samples for coordination purposes.
 - 2. Receive and unload products at site; inspect for completeness or damage jointly with VCCS.
 - 3. Repair or replace items damaged by construction activities after receipt.

3.03 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.

- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Prevent contact with material that may cause corrosion, discoloration, or staining.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01700

EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of VCCS personnel.
- I. Closeout procedures, except payment procedures.

1.02 RELATED REQUIREMENTS

- A. Section 01100 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01300 - Administrative Requirements: Submittals procedures.
- C. Section 01400 - Quality Requirements: Testing and inspection procedures.
- D. Section 01500 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 01500 - Temporary Facilities and Controls: Temporary interior partitions.
- F. Section 01510 - Temporary Utilities: Temporary heating, cooling, and ventilating facilities.
- G. Section 01780 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.
- H. Section 02225 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- I. Section 07840 - Firestopping.
- J. Section 13284 - Removal and Disposal of U.S. Federal Toxic Substances: Removal of equipment containing substances regulated under the Federal Toxic Substances Control Act (TSCA), including but not limited to PCB- and mercury-containing equipment.

1.03 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2004.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.

1. On request, submit documentation verifying accuracy of survey work.
 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
 3. Submit surveys and survey logs for the project record.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
 2. Identify demolition firm and submit qualifications.
 3. Include a summary of safety procedures.
- D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
1. Structural integrity of any element of Project.
 2. Integrity of weather exposed or moisture resistant element.
 3. Efficiency, maintenance, or safety of any operational element.
 4. Visual qualities of sight exposed elements.
 5. Work of VCCS or separate Contractor.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.
- B. For survey work, employ a land surveyor registered in Glenss and Warsaw, Virginia and acceptable to nbj Architecture. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.06 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by VCCS.
- E. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 6 pm to 7 am and weekends.
 2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am and weekends.
- F. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.07 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.

- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After VCCS occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of VCCS's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to nbj Architecture, VCCS, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify nbj Architecture of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to nbj Architecture the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to nbj Architecture.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as shown.
 2. Report discrepancies to nbj Architecture before disturbing existing installation.
 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
1. Provide, erect, and maintain temporary dustproof partitions of construction indicated on drawings in locations indicated on drawings.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work when outside temperatures would cause damage or prevent proper function.
- D. Remove existing work as indicated and as required to accomplish new work.
1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 2. Remove items indicated on drawings.
 3. Relocate items indicated on drawings.
 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and Fire Alarm): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. See Section 01100 for other limitations on outages and required notifications.
 - c. Provide temporary connections as required to maintain existing systems in service.
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to nbj Architecture.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-conforming work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07840, to full thickness of the penetrated element.

J. Patching:

1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.10 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to VCCS's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
- E. Perform instruction in a classroom environment located at Rappahannock Community College.
- F. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with VCCS's personnel in detail to explain all aspects of operation and maintenance.
- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by VCCS prior to final completion before VCCS occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Replace filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces in the area of the Work.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to nbj Architecture and VCCS.
- B. Notify nbj Architecture when work is considered ready for Substantial Completion.
- C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for nbj Architecture's review.
- D. VCCS will occupy portions of the building as specified in Section 01100 and shown in the drawings. VCCS will occupy all of the building upon completion of the Work.
- E. Correct items of work listed in executed Certificates of Substantial Completion and comply with

requirements for access to VCCS-occupied areas.

- F. Notify nbj Architecture when work is considered finally complete.
- G. Complete items of work determined by nbj Architecture's final inspection.

END OF SECTION

SECTION 01734

INDOOR AIR QUALITY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction procedures to promote adequate indoor air quality after construction.

1.02 PROJECT GOALS

- A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
 - 1. Cleaning of ductwork is not contemplated under this Contract.
 - 2. The Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
 - 3. Establish condition of existing ducts and equipment prior to start of alterations.
- B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
 - 1. Furnish products meeting the specifications.
 - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.03 DEFINITIONS

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

PART 3 EXECUTION

2.01 CONSTRUCTION PROCEDURES

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
 - 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems in the construction area for the duration of the activities; remove dust and dirt completely before restarting systems.
- D. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area.
- E. HVAC equipment and supply air ductwork may be used for ventilation during construction:
 - 1. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
 - 2. Do not use return air ductwork for ventilation unless absolutely necessary.

3. Where return air ducts must be used for ventilation, install auxiliary filters at return inlets, sealed to ducts; use filters with at least the equivalent efficiency as those required at supply air side; inspect and replace filters when they lose efficiency.
- F. Do not store construction materials or waste in mechanical or electrical rooms.
- G. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
1. Inspect duct intakes, return air grilles, and terminal units for dust.
 2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 3. Clean tops of doors and frames.
 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 5. Clean return plenums of air handling units.
 6. Remove intake filters last, after cleaning is complete.
- H. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- I. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.

END OF SECTION

SECTION 01780

CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. General Conditions of the Construction Contract (CO-7).
- B. Section 01300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01700 - Execution Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to nbj Architecture with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. nbj Architecture will review draft and return one copy with comments.
 - 2. For equipment, or component parts of equipment put into service during construction and operated by VCCS, submit completed documents within ten days after acceptance.
 - 3. Submit four copies of documents 15 days prior to final inspection. These copies will be reviewed and returned after final inspection, with comments. Revise content of all document sets as required prior to final submission.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with VCCS's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed shop drawings, product data, and samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by VCCS.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
 1. Manufacturer's name and product model and number.
 2. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 3. Field changes of dimension and detail.
 4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
 1. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:
 1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Include color coded wiring diagrams as installed.

- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- L. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment. Tabs are to indicate the specification section of the products.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
 - 1. Part 1: Directory, listing names, addresses, and telephone numbers of nbj Architecture,, Subcontractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.

- e. Maintenance instructions for equipment and systems.
- f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
- 3. Part 3: Project documents and certificates, including the following:
 - a. Shop drawings and product data.
 - b. Certificates.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with VCCS's permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01781

COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions of the Contract Documents apply to the work of this section.

1.2 DESCRIPTION

- A. Commissioning; Commissioning, is a systematic process of ensuring that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.
- B. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
 2. Verify and document proper performance of equipment and systems.
 3. Verify that O&M documentation left on site is complete.
 4. Verify that the Owner's operating personnel are adequately trained.
- C. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
- D. Abbreviations. The following are common abbreviations used in the Project Manual and in the Commissioning Plan.

A/E-	Architect and design engineers	FT-	Functional performance test
CA-	Commissioning authority	GC-	General contractor (prime)
CC	Controls contractor	MC-	Mechanical contractor
Cx-	Commissioning	PC-	Prefunctional checklist
Cx Plan-	Commissioning Plan document	PM-	Project manager (of the Owner)
EC-	Electrical contractor	Subs-	Subcontractors to General
		TAB-	Test and balance contractor

1.3 COORDINATION

- A. Commissioning Team: The members of the commissioning team consist of the Commissioning authority (CA), the Project Manager (PM), the General Contractor (GC or Contractor), the Architect and design engineers (particularly the mechanical engineer), the Mechanical Contractor (MC), the Electrical Contractor (EC), the TAB representative, the Controls Contractor (CC), any other installing subcontractors or suppliers of equipment. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.
- B. Management: The CA directs and coordinates the commissioning activities and reports to the A/E and the Owner. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.
- C. Scheduling:
 - 1. The CA will work with the PM and GC according to established protocols to schedule the commissioning activities. The CA will provide sufficient notice to the PM and GC for scheduling commissioning activities. The GC will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.
 - 2. The CA will provide the initial schedule of primary commissioning events at the commissioning scoping meeting. The Commissioning Plan—Construction Phase provides a format for this schedule. As construction progresses more detailed schedules are developed by the CA. The Commissioning Plan also provides a format for detailed schedules.

1.4 COMMISSIONING PROCESS

- A. Commissioning Specifications: The Commissioning Specifications are binding on the Contractor. The commissioning specifications provide guidance in the execution of the commissioning process. After the initial commissioning scoping meeting the CA will issue an initial Commissioning Plan that will continue to evolve and expand in detail as the project progresses.
- B. Commissioning Process: The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
 - 1. Commissioning during construction begins with a scoping meeting conducted by the CA where the commissioning process is reviewed with the commissioning team members.
 - 2. Additional meetings will be required throughout construction, scheduled by the CA with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
 - 3. Equipment documentation is submitted to the CA during normal submittals, including detailed start-up procedures.

4. The CA works with the Subs in developing startup plans and startup documentation formats, including providing the Subs with prefunctional checklists to be completed, during the startup process.
5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with prefunctional checklists being completed before functional testing.
6. The Subs, under their own direction, execute and document the prefunctional checklists and perform startup and initial checkout. The CA documents that the checklists and startup were completed according to the approved plans. This may include the CA witnessing start-up of selected equipment.
7. The CA develops specific equipment and system functional performance test procedures. The Subs review the procedures.
8. The procedures are executed by the Subs, under the direction of, and documented by the CA.
9. Items of non-compliance in material, installation or setup are corrected at the Sub's expense and the system retested.
10. The CA reviews the O&M documentation for completeness.
11. Commissioning is completed before Substantial Completion.
12. The CA reviews, pre-approves and coordinates the training provided by the Subs and verifies that it was completed.
13. Deferred testing is conducted, as specified or required.

1.5 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process are provided in this section. The responsibilities of the mechanical contractor, TAB and controls contractor are in Division 15 and those of the electrical contractor in Division 16.
- B. The services for the Project Manager, Architect, HVAC mechanical and electrical designers/engineers are not provided for in this contract. Their responsibilities are listed here to clarify the commissioning process.
- C. All Parties: Attend commissioning scoping meeting and additional meetings, as necessary.
- D. Architect:
 1. Construction and Acceptance Phase:
 - a. Manage the CA contract.
 - b. Attend the commissioning scoping meeting and selected commissioning team meetings.

- c. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted.
 - d. Provide any design narrative documentation requested by the CA.
 - e. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
 - f. Prepare and submit final as-built design intent documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
 - 2. Warranty Period: Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.
- E. Mechanical and Electrical Engineers:
- 1. Construction and Acceptance Phase:
 - a. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. One site observation should be completed just prior to system startup.
 - b. Provide any design narrative and sequences documentation requested by the CA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
 - c. Attend commissioning scoping meetings and other selected commissioning team meetings.
 - d. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
 - e. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
 - f. From the Contractor's red-line drawings, edit and update one-line diagrams developed as part of the design narrative documentation and those provided by the vendor as shop drawings for the chilled and hot water, condenser water, domestic water, steam and condensate systems; supply, return and exhaust air systems and emergency power system.
 - g. Provide a presentation at one of the training sessions for the Owner's personnel.
 - h. Review the prefunctional checklists for major pieces of equipment for sufficiency prior to their use.

- i. Review the functional test procedure forms for major pieces of equipment for sufficiency prior to their use.
 - j. Witness testing of selected pieces of equipment and systems.
 - 2. Warranty Period: Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.
- F. Commissioning Authority (CA): The CA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the general contractor and the A/E. The primary role of the CA is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the documented design intent and in accordance with the Contract Documents. The Contractors will provide all tools or the use of tools to start, check-out and functionally test equipment and systems, except for specified testing with portable data-loggers, which shall be supplied and installed by the CA.
 - 1. Construction and Acceptance Phase:
 - a. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
 - b. Coordinate the commissioning work and, with the GC and PM, ensure that commissioning activities are being scheduled into the master schedule.
 - c. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
 - d. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures.
 - e. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
 - f. Review and approve normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
 - g. Write and distribute prefunctional tests and checklists.
 - h. Develop an enhanced start-up and initial systems checkout plan with Subs.

- i. Perform site visits, as necessary, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
- j. Witness all or part of the HVAC piping test and flushing procedure, sufficient to be confident that proper procedures were followed. Document this testing and include the documentation in O&M manuals. Notify owners project manager of any deficiencies in results or procedures.
- k. Witness all or part of any ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Document this testing and include the documentation in O&M manuals. Notify owner's project manager of any deficiencies in results or procedures.
- l. Approve prefunctional tests and checklist completion by reviewing prefunctional checklist reports and by selected site observation and spot checking.
- m. Approve systems startup by reviewing start-up reports and by selected site observation.
- n. Review TAB execution plan.
- o. Oversee sufficient functional testing of the control system and approve it to be used for TAB, before TAB is executed.
- p. Approve air and water systems balancing by spot testing, by reviewing completed reports and by selected site observation.
- q. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone datalogger monitoring or manual functional testing. Submit to PM for review, and for approval if required.
- r. Analyze any functional performance trend logs and monitoring data to verify performance.
- s. Coordinate, witness and approve manual functional performance tests performed by installing contractors. Coordinate retesting as necessary until satisfactory performance is achieved. Perform actual functional testing without contractors on equipment so specified in Sections 15030.
- t. Maintain a master deficiency and resolution log and a separate testing record. Provide the PM with written progress reports and test results with recommended actions.

- u. Witness performance testing of smoke control systems by others and all other owner contracted tests or tests by manufacturer's personnel over which the CA may not have direct control. Document these tests and include this documentation in Commissioning Record in O&M manuals.
- v. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.
- w. Oversee and approve the training of the Owner's operating personnel.
- x. Compile and maintain a commissioning record and building systems book(s).
- y. Review and approve the preparation of the O&M manuals.
- z. Provide a final commissioning report (as described in this section).
- aa. Optional: Prepare a standard trend logging package of primary parameters that will provide the operations staff clear indications of system function in order to identify proper system operation and trouble shoot problems. The CA shall also provide any needed information on interpreting the trends.

2. Warranty Period:

- a. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.
- b. Return to the site at 10 months into the 12 month warranty period and review with facility staff the current building operation and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify areas that may come under warranty or under the original construction contract. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.
- c. Optional: Assist in the development of a preventative maintenance plan, a detailed operating plan or an energy and resource management plan or as-built documentation.

G. Owner's Project Manager (PM):

1. Construction and Acceptance Phase:

- a. Manage the contract of the A/E and of the GC.
- b. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan—Construction Phase.

- c. Provide final approval for the completion of the commissioning work.
 - 2. Warranty Period: Ensure that any seasonal or deferred testing and any deficiency issues are addressed.
- H. General Contractor (GC):
 - 1. Construction and Acceptance Phase:
 - a. Facilitate the coordination of the commissioning work by the CA, and with the GC and CA ensure that commissioning activities are being scheduled into the master schedule.
 - b. Include the cost of commissioning in the total contract price.
 - c. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CA.
 - d. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
 - e. Ensure that all Subs execute their commissioning responsibilities according to the Contract Documents and schedule.
 - f. A representative shall attend a commissioning scoping meeting and other necessary meetings scheduled by the CA to facilitate the Cx process.
 - g. Coordinate the training of owner personnel.
 - h. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
 - 2. Warranty Period:
 - a. Ensure that Subs execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.
 - b. Ensure that Subs correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.
- I. Equipment Suppliers:
 - 1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
 - 2. Assist in equipment testing per agreements with Subs.

3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone datalogging equipment that may be used by the CA.
4. Through the contractors they supply products to, analyze specified products and verify that the designer has specified the newest most updated equipment reasonable for this project's scope and budget.
5. Provide information requested by CA regarding equipment sequence of operation and testing procedures.
6. Review test procedures for equipment installed by factory representatives.

1.6 DEFINITIONS

Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.

Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.

Architect/Engineer (A/E) - the prime consultant (Architect) and sub-consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.

Basis of Design - The basis of design is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The basis of design describes the systems, components, conditions and methods chosen to meet the intent. Some reiterating of the design intent may be included.

Commissioning Authority (CA) - an independent agent, the CA directs and coordinates the day-to-day commissioning activities. The CA does not take an oversight role.

Commissioning Plan - an overall plan that provides the structure, schedule and coordination planning for the commissioning process.

Contract Documents - the documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.).

Contractor - the general contractor or authorized representative.

Control system - the central building energy management control system.

Datalogging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers separate from the control system.

Deferred Functional Tests - FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.

Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).

Design Intent - a dynamic document that provides the explanation of the ideas, concepts and criteria that are considered to be very important to the owner. It is initially the outcome of the programming and conceptual design phases.

Design Narrative or Design Documentation - sections of either the Design Intent or Basis of Design.

Factory Testing - testing of equipment on-site or at the factory by factory personnel with an Owner's representative present.

Functional Performance Test (FT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FTs are performed after prefunctional checklists and startup are complete.

General Contractor (GC) - the prime contractor for this project. Generally refers to all the GC's subcontractors as well. Also referred to as the Contractor, in some contexts.

Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.

Non-Compliance - see Deficiency.

Non-Conformance - see Deficiency.

Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50F to 75F to verify economizer operation). See also "Simulated Signal."

Owner-Contracted Tests - tests paid for by the Owner outside the GC's contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.

Phased Commissioning - commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.

Prefunctional Checklist (PC) - a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CA to the Sub. Prefunctional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some prefunctional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). The word prefunctional refers to before functional testing. Prefunctional checklists augment and are combined with the manufacturer's start-up checklist. Even without a commissioning process, contractors typically perform some, if not many, of the prefunctional checklist items a commissioning authority will recommend. However, few contractors document in writing the execution of these checklist items. Therefore, for most equipment, the contractors execute the checklists on their own. The commissioning authority only requires that the procedures be documented in writing, and does not witness much of the prefunctional checklisting, except for larger or more critical pieces of equipment,

Project Manager (PM) - the contracting and managing authority for the Owner over the design and/or construction of the project, a staff position.

Sampling - functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

Seasonal Performance Tests - FT that are deferred until the system(s) will experience conditions closer to their design conditions.

Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).

Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.

Specifications - the construction specifications of the Contract Documents.

Startup - the initial starting or activating of dynamic equipment, including executing prefunctional checklists.

Subs - the subcontractors to the GC who provide and install building components and systems.

Test Procedures - the step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CA.

Test Requirements - requirements specifying what modes and functions shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents.

Trending - monitoring using the building control system. Vendor - supplier of equipment.

Warranty Period - warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

1.7 SYSTEMS TO BE COMMISSIONED

A. The following checked systems will be commissioned in this project.

Equipment and System	Functional Test Requirements Specified In:	Equipment and System	Functional Test Requirements Specified In:
HVAC System	15950	_Equipment vibration control	15950
_Chillers	15950		
_Pumps	15950		
_Boilers	15950		
_Piping systems	15950		
_Ductwork	15950		
_Variable frequency drives	15950		
_Air handlers	15950		
_Terminal units (air)	15950	Other	
_Unit heaters	15950	_Service water heaters	15950
_Testing, Adjusting and Balancing work	15950		
_Chemical treatment systems	15950		
_HVAC control system	15950		
_Fire and smoke dampers	15950		
_Indoor air quality ¹	15950		

¹ Indoor air quality (IAQ) commissioning does not ensure that indoor air quality will be adequate or without deficiency at building turnover or during occupancy, unless the Owner has specifically specified that actual air quality testing is performed. Commissioning indoor air quality entails performing tasks that minimize the potential for IAQ problems, but it does not eliminate their possibility.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Division contractor for

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the equipment being tested. For example, the mechanical contractor of Division 15 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system in Division 15, except for equipment specific to and used by TAB in their commissioning responsibilities. Two-way radios shall be provided by the General Contractor.

- B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and left on site, except for stand-alone datalogging equipment that may be used by the CA.
- C. Datalogging equipment and software required to test equipment will be provided by the CA, but shall not become the property of the Owner.
- D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply:
 - 1. Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F.
 - 2. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year.
 - 3. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.
- E. Additional equipment may be required to simulate required test conditions, as specified herein.

PART 3 – EXECUTION

3.1 MEETINGS

- A. Scoping Meeting: Within 60-90 days of commencement of construction, the CA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CA. Information gathered from this meeting will allow the CA to prepare the Commissioning Plan to which will be distributed to all parties.
- B. Miscellaneous Meetings: Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Subs. The CA will plan these meetings and will minimize unnecessary time being spent by Subs. These meetings may be held monthly, until the final three (3) months of construction when they may be held as frequently as one per week.

3.2 REPORTING

- A. The CA will provide regular reports to the PM, with increasing frequency as construction and commissioning progresses. Standard forms are provided and referenced in the Commissioning Plan.
- B. The CA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning progress and scheduling changes through memos, progress reports, etc.
- C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.
- D. A final summary report (about four to six pages, not including backup documentation) by the CA will be provided to the PM, focusing on evaluating commissioning process issues and identifying areas where the process could be improved. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report. Prefunctional checklists, functional tests and monitoring reports will not be part of the final report, but will be stored in the Commissioning Record in the O&M manuals.

3.3 SUBMITTALS

- A. The CA will provide appropriate contractors with a specific request for the type of submittal documentation the CA requires to facilitate the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum, the request will include the manufacturer and model number, the manufacturer's printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning authority. All documentation requested by the CA will be included by the Subs in their O&M manual contributions.
- B. The Commissioning Authority will review and approve submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of functional testing procedures and only secondarily to verify compliance with equipment specifications. The Commissioning authority will notify the A/E, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.
- C. The CA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the design intent documentation and sequences provided with the Specifications.
- D. These submittals to the CA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the CA will review and approve them.

3.4 START-UP, PREFUNCTIONAL CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment to be commissioned. Some systems that are not comprised so much of actual dynamic machinery, e.g., electrical system power quality, may have very simplified PCs and startup.
- B. General: Prefunctional checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.
- C. Start-up and Initial Checkout Plan: The CA shall assist the commissioning team members responsible for startup of any equipment in developing detailed start-up plans for all equipment. The primary role of the CA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. Parties responsible for prefunctional checklists and startup are identified in the commissioning scoping meeting and in the checklist forms. Parties responsible for executing functional performance tests are identified in the testing requirements in Divisions 15 and 16.
 - 1. The CA adapts, if necessary, the representative prefunctional checklists and procedures. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
 - 2. These checklists and tests are provided by the CA to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.
 - 3. The subcontractor responsible for the purchase of the equipment develops the full start-up plan by combining (or adding to) the CA's checklists with the manufacturer's detailed start-up and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
 - 4. The full start-up plan could consist of something as simple as:
 - a. The CA's prefunctional checklists.
 - b. The manufacturer's standard written start-up procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - c. The manufacturer's normally used field checkout sheets.
 - 5. The subcontractor submits the full startup plan to the CA for review and approval.

6. The CA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be added.
 7. The full start-up procedures and the approval form may be provided to the CM for review and approval, depending on management protocol.
- D. Sensor and Actuator Calibration: All field-installed temperature, relative humidity, CO, CO₂ and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used, if approved by the Owner before-hand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
1. All procedures used shall be fully documented on the prefunctional checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
 2. Sensor Calibration Methods
 - a. All Sensors. Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, verify that they are reading within 0.2°F of each other for temperature and within a tolerance equal to two percent (2%) of the reading, of each other, for pressure. Tolerances for critical applications may be tighter.
 - b. Sensors Without Transmitters—Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system [BAS]) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
 - c. Sensors With Transmitters—Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system [BAS]) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

- d. Critical Applications. For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

3. Tolerances, Standard Applications

<u>Sensor</u>	<u>Required Tolerance (+/-)</u>	<u>Sensor</u>	<u>Required Tolerance (+/-)</u>
Cooling coil, chilled and condenser water temps	0.4 F	Flow rates, water	4% of design
AHU wet bulb or dew point	2.0F	Relative humidity	4% of design
		Combustion flue temps	5.0F
Hot water coil and boiler water temp	1.5F	CO ₂ monitor	0.1 % pts
Outside air, space air, duct air temps	0.4F	CO monitor	0.01 % pts
Watt hour, voltage & amperage	1% of design	Natural gas flow rate	1% of design
Pressures, air, water and gas	3% of design	Barometric pressure	0.1 in. of Hg
Flow rates, air	10% of design		

4. Valve and Damper Stroke Setup and Check:

- a. EMS Readout: For all valve and damper actuator positions checked, verify the actual position against the BAS readout. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator.
- b. Closure for heating coil valves (NO): Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close.
- c. Closure for cooling coil valves (NC): Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open.

E. Execution of Prefunctional Checklists and Startup:

1. Four (4) weeks prior to startup, the Subs and vendors schedule startup and checkout with the PM, GC and CA. The performance of the prefunctional checklists, startup and checkout are directed and executed by the Sub or vendor. When checking off prefunctional checklists, signatures may be required of other Subs for verification of completion of their work.

2. The CA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units, (in which case a sampling strategy may be used as approved by the PM). In no case will the number of units witnessed be less than four (4) on any one building, nor less than twenty percent (20%) of the total number of identical or very similar units.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CA shall observe a sampling of the prefunctional and start-up procedures. The sampling procedures are identified in the commissioning plan.
4. The Subs and vendors shall execute startup and provide the CA with a signed and dated copy of the completed start-up and prefunctional tests and checklists.
5. Only individuals that have direct knowledge and witnessed that a line item task on the prefunctional checklist was actually performed shall initial or check that item off. It is not acceptable for witnessing supervisors to fill out these forms.

F. Deficiencies, Non-Conformance and Approval in Checklists and Startup:

1. The Subs shall clearly list any outstanding items of the initial start-up and prefunctional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CA within two days of test completion.
2. The CA reviews the report and submits either a non-compliance report or an approval form to the Sub or PM. The CA shall work with the Subs and vendors to correct and retest deficiencies or uncompleted items. The CA will involve the PM and others as necessary. The installing Subs or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CA recommends approval of the execution of the checklists and startup of each system to the PM using a standard form.
3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in backcharges to the responsible party.

3.5 PHASED COMMISSIONING

- A. This project will require startup and initial checkout to be executed in phases.

3.6 FUNCTIONAL PERFORMANCE TESTING

- A. The general list of equipment to be commissioned is specified herein. The specific equipment and modes to be tested are found in Divisions 15 and 16.
- B. The parties responsible to execute each test are listed with each test in Divisions 15 and 16.

- C. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the documented design intent and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.
1. In general, each system shall be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc, shall also be tested. Specific modes required in this project are given in Divisions 15 and 16.
- D. Development of Test Procedures: Before test procedures are written, the CA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements in Divisions 15 and 16, the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Sub or vendor responsible to execute a test shall provide limited assistance to the CA in developing the procedures review (answering questions about equipment, operation, sequences, etc.)- Prior to execution, the CA shall provide a copy of the test procedures to the Sub(s) who shall review the tests for feasibility, safety, equipment and warranty protection. The CA may submit the tests to the A/E for review, if requested.
1. The CA shall review owner-contracted, factory testing or required owner acceptance tests which the CA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.
 2. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.
 3. The test procedure forms developed by the CA shall include (but not be limited to) the following information:
 - a. System and equipment or component name(s)
 - b. Equipment location and ID number
 - c. Unique test ID number, and reference to unique prefunctional checklist and start-up documentation ID numbers for the piece of equipment
 - d. Date
 - e. Project name
 - f. Participating parties
 - g. A copy of the specification section describing the test requirements
 - h. A copy of the specific sequence of operations or other specified parameters being verified
 - i. Formulas used in any calculations
 - j. Required pre-test field measurements

- k. Instructions for setting up the test.
- l. Special cautions, alarm limits, etc.
- m. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
- n. Acceptance criteria of proper performance with a Yes / No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved.
- o. A section for comments
- p. Signatures and date block for the CA

E. Test Methods:

1. Functional performance testing and verification may be achieved by manual testing, (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone dataloggers. The CA may substitute specified methods or require an additional method to be executed, other than what was specified, with the approval of the PM. This may require a change order and adjustment in charge to the Owner. The CA will determine which method is most appropriate for tests that do not have a method specified.
2. Simulated Conditions. Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
3. Overwritten Values. Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as (he interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable, e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall be calibrated.
4. Simulated Signals. Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
5. Altering Setpoints. Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55F, when the outside air temperature is above 55F, temporarily change the lockout setpoint to be 2F above the current outside air temperature.
6. Indirect Indicators. Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during prefunctional testing.

7. Setup. Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Sub executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Sub shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
8. Sampling. Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. It is noted that no sampling by Subs is allowed in prefunctional checklist execution.

A common sampling strategy referenced in the Project Manual as the "xx% Sampling—yy% Failure Rule" is defined by the following example.

xx = the percent of the group of identical equipment to be included in each sample.
yy = the percent of the sample that if failing, will require another sample to be tested.

The example below describes a 20% Sampling—10% Failure Rule.

- a. Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the "first sample."
 - b. If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
 - c. If 10% of the units in the second sample fail, test all remaining units in the whole group.
 - d. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.
- F. Coordination and Scheduling: The Subs shall provide sufficient notice to the CA regarding their completion schedule for the prefunctional checklists and startup of all equipment and systems. The CA will schedule functional tests through the PM, GC and affected Subs. The CA shall direct, witness and document the functional testing of all equipment and systems. The Subs shall execute the tests.
1. In general, functional testing is conducted after prefunctional testing and startup has been satisfactorily completed. The control system is sufficiently tested and approved by the CA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and

debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

- G. Test Equipment: Refer to Part 2 for test equipment requirements.
- H. Problem Solving: The CA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subs and A/E.

3.7 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

- A. Documentation: The CA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the PM for review and approval and to the Subs for review. The CA will include the filled out forms in the O&M manuals.
- B. Non-Conformance:
 - 1. The CA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the PM on a standard non-compliance form.
 - 2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CA. In such cases the deficiency and resolution will be documented on the procedure form.
 - 3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the PM.
 - 4. As tests progress and a deficiency is identified, the CA discusses the issue with the executing contractor.
 - a. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
 - 1) The CA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence. After the day's work, the CA submits the non-compliance reports to the PM for signature, if required. A copy is provided to the Sub and CA. The Sub corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CA,
 - 2) The CA reschedules the test and the test is repeated.

- b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
 - 1) The deficiency shall be documented on the non-compliance form with the Sub's response and a copy given to the PM and to the Sub representative assumed to be responsible.
 - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Project Manager.
 - 3) The CA documents the resolution process.
 - 4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CA. The CA reschedules the test and the test is repeated until satisfactory performance is achieved.
- 5. Cost of Retesting:
 - a. The cost for the Sub to retest a prefunctional or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
 - b. For a deficiency identified, not related to any prefunctional checklist or start-up fault, the following shall apply: The CA and PM will direct the retesting of the equipment once at no "charge" to the GC for their time. However, the CA's and PM's time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.
 - c. The time for the CA and PM to direct any retesting required because a specific prefunctional checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the GC, who may choose to recover costs from the party responsible for executing the faulty prefunctional test.
- 6. The Contractor shall respond in writing to the CA and PM at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
- 7. The CA retains the original non-conformance forms until the end of the project.
- 8. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the prime contractor.
- C. Failure Due to Manufacturer Defect: If ten percent (10%), or three (3), whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to

manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the PM. In such case, the Contractor shall provide the Owner with the following:

1. Within one week of notification from the PM, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the PM within two weeks of the original notice.
 2. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 3. The PM will determine whether a replacement of all identical units or a repair is acceptable.
 4. Two (2) examples of the proposed solution will be installed by the Contractor and the PM will be allowed to test the installations for up to one week, upon which the PM will decide whether to accept the solution.
 5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- D. Approval: The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CA and by the PM, if necessary. The CA recommends acceptance of each test to the PM using a standard form. The PM gives final approval on each test using the same form, providing a signed copy to the CA and the Contractor.

3.8 OPERATION AND MAINTENANCE MANUALS

A. Standard O&M Manuals:

1. The specific content and format requirements for the standard O&M manuals are detailed in Division 01. Special requirements for the controls contractor and TAB contractor are found in Division 15.
2. A/E Contribution. The A/E will include in the beginning of the O&M manuals a separate section describing the systems including:
 - a. The design intent narrative prepared by the A/E and provided as part of the bid documents, updated to as-built status by the A/E.
 - b. Simplified professionally drawn single line system diagrams on 8 1/2" x 11" or 11" x 17" sheets. These shall include chillers, water system, condenser water system, heating system, supply air systems, exhaust systems and similar equipment. These shall show major

pieces of equipment such as pumps, chillers, boilers, control valves, expansion tanks, coils, service valves, etc.

3. CA Review and Approval. Prior to substantial completion, the CA shall review the O&M manuals, documentation and redline as-builds for systems that were commissioned to verify compliance with the Specifications. The CA will communicate deficiencies in the manuals to the PM and A/E. Upon a successful review of the corrections, the CA recommends approval and acceptance of these sections of the O&M manuals to the PM and A/E. The CA also reviews each equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract

B. Commissioning Record in O&M Manuals:

1. The CA is responsible to compile, organize and index the following commissioning data by equipment into labeled, indexed and tabbed, three-ring binders and deliver it to the GC, to be included with the O&M manuals. Three (3) copies of the manuals will be provided. The format of the manuals shall be:

Tab I-1 Commissioning Plan

Tab 1-2 Final Commissioning Report (see (B.2) below)

Tab 01 System Type 1 (chiller system, packaged unit, boiler system, etc.)

Sub-Tab A Design narrative and criteria, sequences, approvals for Equipment 1

Sub-Tab B Startup plan and report, approvals, corrections, blank prefunctional checklists Colored Separator Sheets—for each equipment type (fans, pumps, chiller, etc.)

Sub-Tab C Functional tests (completed), trending and analysis, approvals and corrections, training plan, record and approvals, blank functional test forms and a recommended recommissioning schedule.

Tab 02 System Type 2...repeat as per System 1

2. Final Report Details: The final commissioning report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas: 1) Equipment meeting the equipment specifications, 2) Equipment installation, 3) Functional performance and efficiency, 4) Equipment documentation and design intent, and 5) Operator training. All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented. The functional performance and efficiency section for each piece of equipment shall include a brief description of the verification method used (manual testing, BAS trend logs, data loggers, etc.) and include observations and conclusions from the testing.

3. Other documentation will be retained by the CA.

3.9 TRAINING OF OWNER PERSONNEL

- A. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
- B. The CA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment and systems.
 1. The CA shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most valuable. The Owner and CA shall decide how rigorous the training should be for each piece of commissioned equipment. The CA shall communicate the results to the Subs and vendors who have training responsibilities.
 2. In addition to these general requirements, the specific training requirements of Owner personnel by Subs and vendors is specified in Divisions 15 and 16.
 3. Each Sub and vendor responsible for training will submit a written training plan to the CA for review and approval prior to training. The plan will cover the following elements:
 - a. Equipment (included in training)
 - b. Intended audience
 - c. Location of training
 - d. Objectives
 - e. Subjects covered (description, duration of discussion, special methods, etc.
 - f. Instructor for each subject
 - g. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
 4. For the primary HVAC equipment, the Controls Contractor shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.
 5. The CA develops an overall training plan and coordinates and schedules, with the CM and GC, the overall training for the commissioned systems. The CA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CA recommends approval of the training to the PM using a standard form.
 6. At one of the training sessions, the CA conducts a presentation discussing the use of the blank functional test forms for re-commissioning equipment.

7. The mechanical design engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, condenser water or heat rejection systems, heating systems, fuel oil and gas supply systems, supply air systems, exhaust system and outside air strategies.

3.10 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the PM. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.
- B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) specified in Division 15 shall be completed as part of this contract. The CA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate Subs, with facilities staff and the CA witnessing. Any final adjustments to the O&M manuals and as-builds due to the testing will be made.

3.11 WRITTEN WORK PRODUCTS

- A. The commissioning process generates a number of written work products described in various parts of the Specifications. The Commissioning Plan—Construction Phase, lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them and the location of the specification to create them. In summary, the written products are;

<u>Product</u>	<u>Developed By</u>
1. Final commissioning plan	CA
2. Meeting minutes	CA
3. Commissioning schedules	CA with GC and PM
4. Equipment documentation submittals	Subs
5. Sequence clarifications	Subs and A/E as needed
5. Prefunctional checklists	CA
6. Startup and initial checkout plan	Subs and CA (compilation of existing documents)
7. Startup and initial checkout forms filled out	Subs
8. Final TAB report	TAB
9. Issues log (deficiencies)	CA
10. Commissioning Progress Record	CA
11. Deficiency reports	CA
12. Functional test forms	CA
13. Completed functional test forms	Subs
14. O&M manuals	Subs
15. Commissioning record book	CA
16. Overall training plan	CAandPM
17. Specific training agendas	Subs
18. Final commissioning report	CA

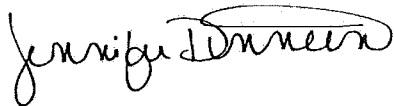
19. Misc. approvals

CA

END OF COMMISSIONING REQUIREMENTS

COMMISSIONING REQUIREMENTS
Rappahannock Community College Renovation
Glenns and Warsaw, Virginia

01781 28
PC: 260-17712
5/11/2010



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**SECTION 02080 Glens
ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The GENERAL CONDITIONS (CO-7), SUPPLEMENTAL GENERAL CONDITIONS and DIVISION 1 GENERAL REQUIREMENTS, shall apply as fully as if included herein.

1.2 NOTES FOR DEMOLITION

- A. The Abatement Contractor shall coordinate with the Mechanical, Electrical, Plumbing, and General Contractors as necessary to ensure that all appropriate systems that will be impacted by demolition have been properly decommissioned prior to the start of any work.
- B. The Abatement Contractor shall coordinate with the General Contractor selected as necessary for this project to verify that the structure will support the planned activities and comply with local building codes and OSHA requirements.

1.3 WORK INCLUDED

- A. The work includes the furnishing of all labor, materials, equipment, insurance and services necessary for and reasonably incidental to the completion of asbestos removal and related work.
- B. Comply with all governing regulations, which the specifications supplement.
- C. Comply with DIVISION 1 GENERAL REQUIREMENT/Front End Section of this specification.

- D. All other work as herein specified. The Contractor will be responsible for obtaining any local, state, and federal permits, as appropriate for this project, prior to starting work. All permits, notifications, patent restrictions or requirements, whether specified in these specifications or not, are the sole responsibility of the Contractor performing the work described in these specifications. **Note:** If during the course of the contract, the Contractor is found to be not in compliance with the project specifications, the Contractor will stop all work until any deficiencies in his performance of this work are corrected. Standby time required to resolve any violations shall be at the Contractor's expense. Likewise, the Contractor will pay for any project delay that his violation causes the Building Owner. The contractor will also be back-charged by the Building Owner for any additional IH/project monitor site visits and/or additional analytical (and collection) fees resulting from poor work practices during removal including failed final air samples.

1.4 REGULATIONS

- A. All work shall conform to the requirements of the U. S. Environmental Protection Agency (EPA), U. S. Department of Labor - Occupational Safety and Health Administration (OSHA) and applicable State regulations relating to asbestos.
- B. The EPA and OSHA regulations shall be posted at the job site for the duration of the work; posting shall be in a location clearly visible to employees and others in the area.

1.5 DEFINITIONS

- A. Accredited/Accreditation: When referring to a person, Contractor or laboratory, means that such person is accredited in accordance with Section 206 of Title II of the Toxic Substances Control Act (AHERA Regulations).
- B. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
- C. Aggressive Sampling: High-activity level air sampling which results in all settled asbestos remaining airborne and uniformly disturbed through the use of special entrainment and mixing techniques. This makes any settled asbestos fibers accessible to the sampling filters for subsequent detection. The technique is described in 40 C.F.R. 763.90, Appendix A to Subpart E; and Guidance for Controlling ACM in Buildings, Appendix M.

- D. Air Filtration Device (AFD): Air filtration device (AFD) is part of the pressure differential system in which the air is filtered. The AFD is to be equipped with HEPA filters.
- E. Air Monitoring: The process of measuring the fiber content of a specific volume of air. NIOSH Method 7400 or TEM Method in 40 C.F.R. 763, Subpart E, Appendix A, will be used for sampling and analysis.
- F. Amended Water: Water to which a surfactant has been added.
- G. Approve: Where used in conjunction with the QP's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, "approved" will be held to limitations of QP's responsibilities and duties and does not release the Contractor from responsibilities to fulfill requirements of the Contract Documents. Approved shall also mean consent by U.S. EPA of training programs and the like.
- H. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, and actinolite-tremolite. Both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered to be asbestos.
- I. Asbestos-Containing Material (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.
- J. Asbestos-Containing Waste Material: Any material, which is or is suspected of being or any material contaminated with an asbestos-containing material, which is to be removed from a Work Area for disposal.
- K. Authorized Visitor: Personnel authorized by the Project Officer, testing lab personnel, or a representative of any Federal, State or local regulatory agency having authority over the project are considered authorized visitors.
- L. Barrier: Any surface that seals off the Work Area to inhibit the movement of fibers.
- M. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

- N. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- O. Certified Industrial Hygienist (CIH): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.
- P. Critical Barrier: Two layers of 6 mil polyethylene sheeting on wall or three layers on floor, spray foam, or duct tape used to completely seal off the Work Area to prevent spread of fibers to surrounding areas.
- Q. Decontamination (Decon) Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower room and a clean room which is used for the decontamination of workers, materials and certain equipment contaminated with asbestos. This shall serve as the only entrance or exist to the Work Area.
- R. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- S. Disposal Bag: A 6-mil thick, leak-proof polyethylene bag used for transporting asbestos waste from the work area to the disposal site. Each is labeled in compliance with OSHA 1926.1101 as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

And U.S. DOT ORM-E label for Asbestos-Hazardous Material (including Asbestos Waste Manifest) and statements as required.

- T. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent release of fibers.
- U. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
- V. Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

- W. Removal Encapsulant: A penetrating encapsulant specifically designed for removal of asbestos-containing materials rather than for in situ encapsulation.
- X. Encapsulation: Treatment of ACM with an encapsulant.
- Y. Enclosure: The construction of an airtight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.
- Z. Filter: A media component used in respirators to remove solid or liquid particles from the respired air.
- AA. Friable Asbestos Material: Material that contains more than 1.0% asbestos by Polarized Light Microscopy (PLM), and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. This includes previously non-friable material which becomes damaged to the extent that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure.
- BB. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- CC. General Supervisor: Site Superintendent, Foreman: is the Contractor's representative at the work site. This person can be the Competent Person required by OSHA, 29 C.F.R. 1926.1101.
- DD. Glovebag: A sack (typically constructed to 6 mil transparent polyethylene) with two inward projecting long sleeve gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.
- EE. HEPA Filter: A high efficiency particulate air (HEPA) filter that removes from air 99.97% or more of monodispersed dioctylphthalate (DOP) or dioctylsebacate (DOS) particles having a mean particle diameter of 0.3 microns.
- FF. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): HEPA filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be 99.97% efficiency for retaining fibers of 0.3 microns or larger.

- GG. Indicated: The term "Indicated" is a cross-reference for Notes or Schedules on Drawings, to other paragraphs or Schedules in the Specifications, and to similar means of recording requirements in Contract Documents.
- HH. Install: Unless defined in greater detail, "install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working on dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- II. Installer: The "installer" is defined as the entity (person or firm) engaged by the Contractor or Sub-Contractor to perform a particular trade at the work site, including installation, erection, application and similar required operations. Such entities (installers) shall be expert in operations they perform.
- JJ. Landfill Receipt: Document signed by a landfill operator acknowledging the receipt of ACM waste.
- KK. Manifest: A document detailing chain of custody for ACM waste hauled.
- LL. Negative Pressure Glovebag: A glovebag that is composed of flexible plastic that can be subjected to negative pressure without collapsing.
- MM. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- NN. Permissible Exposure Limit (PEL): The Contractor shall ensure that no employee is exposed to an airborne fiber concentration of asbestos in excess of the PEL expressed as an 8-hour TWA as determined by the OSHA Reference Method of 29 C.F.R. 1926.1101 (Current PEL for asbestos is 0.1 fiber/cc.).
- OO. Personal Sampling Monitoring: Air samples taken in the breathing zone of workers as required by OSHA 29 C.F.R. 1926.1101.
- PP. Pressure Differential: Air pressure lower than surrounding areas, caused by exhausting air from a sealed space (Work Area).

- QQ. Pressure Differential System: A local exhaust system, utilizing HEPA filtration, capable of maintaining a pressure differential inside the Work Area and a constant airflow from adjacent areas into the Work Area and exhausting that filtered air outside the Work Area.
- RR. Project Manager (Contractor): The asbestos Contractor's employee responsible for the total oversight of the project.
- SS. Project Officer: The owner's employee responsible for overall contract administration.
- TT. Plasticize: Means to cover floors and walls with polyethylene sheeting as herein specified and in accordance with the temporary Enclosure Section.
- UU. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- VV. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.
- WW. Qualified Person (QP): A Registered Architect, Professional Engineer, or Certified Industrial Hygienist who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Management Planner, Project Monitor, and Asbestos Project Designer. The QP must be qualified to perform visual inspections as indicated in ASTM E 1368. The QP shall be appropriately licensed in the State of Virginia as a Project Monitor and Project Designer. **For this project, the QP shall be Mr. Christopher Chapman, CIH of Froehling & Robertson (804-264-2701) in Richmond, Virginia. However, if the Building Owner decides to hire another firm as the Project Monitor, then the contracted firm shall become the QP and will be responsible for any additional sampling and implementation and procedural recommendations and scope interpretations for the project.**
- XX. Regulated ACM: Means friable ACM, non-friable ACM that has become friable, non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading or non-friable ACM that has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the ACM during renovation or demolition.

- YY. Regulated Area: An area where asbestos removal operations are performed which is isolated by physical boundaries to prevent entry of unauthorized persons or the spread of asbestos dust, fibers or debris. Within this area, the airborne concentration of asbestos could reasonably be expected to exceed the PEL.
- ZZ. Removal: The taking out or stripping of all ACM from a damaged area or associated area or space.
- AAA. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
- BBB. Short-Term Exposure Limit (STEL): A "ceiling" concentration, identified in OSHA regulations, of an airborne substance that shall not be exceeded for a duration of any 30-minute period (Current STEL for asbestos is 1.0 fiber/cc).
- CCC. Submittal: Items that is required to be presented to the Project Officer and/or the QP for review, consideration or decision.
- DDD. Surfacing Material: Material in a building that is sprayed-on, trowelled-on or otherwise applied to surfaces or structural members for acoustical, fireproofing or other purposes.
- EEE. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
- FFF. Testing Laboratory: The "testing laboratory" is an independent entity to perform specific air sampling and analysis at the work site and associated areas, to report and (if required) interpret results. Analysis shall be performed by a laboratory accredited by the American Industrial Hygiene Association (AIHA) and having demonstrated a proficient rating in AIHA's Proficiency Analytical Testing (PAT) Program. The laboratory shall be licensed by the Virginia Department of Commerce as an Asbestos Analytical Laboratory. The laboratory shall also be accredited by the National Institute of Standards and Technology (NIST) through the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk sample analysis and air sample analysis by TEM (TEM Method of 40 C.F.R. 763, Subpart E, Appendix A).

- GGG. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.
- HHH. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed water vapor.
- III. Waste Shipment Record: Means the original shipping document, originated and signed by the waste generator (Abatement Contractor) used to track and substantiate the disposal of ACM waste as described in 40 CFR Part 61.
- JJJ. Waste Generator: Means the licensed Asbestos Abatement Contractor removing ACM waste from the property.
- KKK. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils that have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-containing waste.
- LLL. Work Area: The area where asbestos-related work or removal operations are performed; the Work Area is defined and/or isolated to prevent the spread of asbestos dust, fibers, or debris, and entry by unauthorized personnel. The Work Area is a Regulated Area as defined by 29 CFR 1926.1101.
- MMM. Work Site: The term "work site" is defined as the space available to the Contractor for performance of the work either exclusively or in conjunction with others performing other work as part of the project. The extent of project site is shown on the Drawings, and may or may not be identical with the description of land upon which the project is to be built.
- NNN. Negative Pressure Enclosure: Pressure differential of a minimum of -0.02 column inches of water as related to outside pressure. Utilization of a manometer shall be use as evidence.

ABBREVIATIONS AND NAMES:

The following acronyms or abbreviations referenced in Contract Documents are defined to mean the associated names. Both names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up-to-date as of the date of the Contract Documents:

ACM	Asbestos Containing Material
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC. 20006 (202) 626-7474
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018 (212) 354-3300
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103 (215) 299-5400
CFR	Code of Federal Regulations Available from Government Printing Office Washington, DC. 20402 (Usually first Published in Federal Register)
EPA	Environmental Protection Agency 401 M Street, SW Washington, DC. 20460 (202) 382-3949
f/cc	fibers per cubic centimeter
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology (U.S. Department of Commerce)

Gaithersburg, MD 20234
(301) 921-1000

OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) Government Printing Office Washington, DC. 20402
TEM	Transmission Electron Microscopy
VA DPOR	Virginia Department of Professional and Occupational Regulation 3600 West Broad Street Richmond, Virginia 23230-4917 (804) 367-8500
UL	Underwriters Laboratories 333 Pfinningsten Road Northbrook, IL 60062

1.6 INFORMATION TO BE SUBMITTED AFTER CONTRACT IS AWARDED

- A. Immediately upon award of the Contract, and before any work is commenced, Contractor shall submit for information of the Owner and Engineer the data listed below, and shall be in quantity to allow the Owner to retain two copies and the Engineer to retain one copy. The data shall show compliance with the requirements of the Contract Documents and governing regulations.
- 1) Method and means of removal and encapsulation of asbestos-containing materials.
 - 2) Containment and shrouding procedures, including any unusual conditions.
 - 3) Air sampling plan.
 - 4) Name of laboratory to be used in air sample analysis and copy of American Industrial Hygiene Association (AIHA) Accreditation.
 - 5) Location of change and decontamination area.
 - 6) Location of landfill for disposal of asbestos waste that has been approved by EPA.

- 7) Manufacturer's technical data sheets on proposed surfactant, encapsulant, mastic removers, etc.
- 8) Certificate of Insurance with notarized statement thereon that all requirements stated in paragraphs 13 (a) through 13 (d) are covered.
- 9) Copies of Asbestos Worker's License and Asbestos Supervisors License.
- 10) Copies of Asbestos Worker's and Asbestos Supervisors medical asbestos/respirator clearance.
- 11) Notifications to all appropriate state and federal agencies and local fire and police departments.

1.7 SCOPE OF WORK

- A. The Scope of Work includes, but is not necessarily limited, to the following:
 - 1) The Abatement Contractor shall be responsible for removal of all asbestos-containing materials impacted by this project based on the drawings provided to F&R dated November 5, 2009. These materials include vinyl floor tiles and associated mastic, laboratory drying racks, laboratory hoods, silver roof paint, tar on roof mounted equipment, and pipe elbow tar.
 - 2) The Abatement Contractor has the responsibility for determining actual quantities of materials to be removed and reviewing the scope of work. The Contractor should allow under their base bid for the removal of all materials as referenced in this specification. **All presumed/newly discovered asbestos-containing materials (PACM) shall be tested prior to removal by the Owner's project monitor. The Abatement Contractor shall not remove any of the PACM/newly discovered ACMs without the approval of the QP or the owner's representative. The Owner's representative or QP will verify quantities as they are removed. Any quantities less than the amounts estimated by the Abatement Contractor will be credited to The Owner.**

- 3) All mobilizations and permit notifications shall be the Abatement Contractors responsibility.
- 4) This section includes all work necessary to reduce air concentrations of asbestos to the specified level and maintain the specified asbestos control limits during the life of the contract. It also contains removal, containment, and disposal of asbestos-containing materials. The work specified in this document consists of the provision of services for the removal and disposal of asbestos-containing building materials (ACBMs). Asbestos materials have been identified in the areas where work will be performed.
- 5) All asbestos abatement work will be performed by competent, licensed (by the Virginia Department of Professional and Occupational Regulation) persons trained, qualified, and knowledgeable in the techniques of abatement, handling, and disposal of ACBMs and materials contaminated by asbestos, in accordance with pertinent local, state, and federal regulations.
- 6) The Abatement Contractor shall remove the following materials as part of the base bid:
 - a) All asbestos containing floor tiles and associated mastic (some present under carpet and fixtures) that will be impacted during planned renovation located throughout the renovation areas. Approximately 25,450 square feet of flooring materials. Floor plans have also been attached to this specification indicating areas to be abated. Note 1: **As part of the base bid, the Abatement Contractor shall remove all layers of floor tiles and mastic and any associated carpeting.** Note 2: The Abatement Contractor shall be responsible for removal of all VAT and mastic under carpets, partition walls, fixtures, cabinets, and other furnishings and obstructions where directed by the owner to remove these materials. Note 3: The Abatement Contractor shall remove these materials within a negative pressure containment as described in Part 3 – Execution of this document.
 - b) All asbestos containing pipe elbow tar that will be impacted during planned renovation located throughout the renovation areas. Approximately 550 linear feet of pipe elbow tar on various fittings throughout the renovation areas. Note 1: **As**

part of the base bid, the Abatement Contractor shall remove all pipe elbow tar to be impacted by the planned renovation.

Note 2: The Abatement Contractor shall remove these materials within a negative pressure containment or glove bag as described in Part 3 – Execution of this document.

- c) All asbestos containing laboratory drying racks that will be impacted during planned renovation located throughout the renovation areas. Approximately 200 square feet of laboratory drying racks. Note 1: **As part of the base bid, the Abatement Contractor shall remove all laboratory drying racks impacted by this project.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.
- d) All asbestos containing laboratory hoods and associated piping that will be impacted during planned renovation located throughout the renovation areas. Approximately 2 laboratory hoods. Note 1: **As part of the base bid, the Abatement Contractor shall remove all laboratory hoods and associated piping impacted by this project.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.
- e) All asbestos containing silver roof paint that will be impacted during planned renovation located throughout the renovation areas. Approximately 300 linear feet of silver roof paint. Note 1: **As part of the base bid, the Abatement Contractor shall remove all silver roof paint to be impacted by the planned renovation.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.
- f) All asbestos containing roof equipment tar that will be impacted during planned renovation of this building. Approximately 1,800 square feet of roof equipment tar. Note 1: **As part of the base bid, the Abatement Contractor shall remove all roof equipment tar to be impacted by the planned renovation.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.

GENERAL NOTES:

NOTE 1: The Abatement Contractor shall submit unit cost estimates for the following items:

1. Removal of asbestos-containing flooring materials (including floor tiles, carpet, and associated mastic) within negative pressure containment, per square foot.
2. Removal of asbestos-containing flooring materials (including floor tiles, carpet, and associated mastic) intact, per square foot.
3. Removal of asbestos-containing pipe elbow tar within negative pressure containment, per linear foot.
4. Removal of asbestos-containing pipe elbow tar within a glovebag, per linear foot.
5. Removal of laboratory drying racks intact, per square foot.
6. Removal of laboratory hoods and associated piping intact, per hood.
7. Removal of silver roof paint intact, per linear foot.
8. Removal of roof equipment tar intact, per square foot.
9. Removal of fan coil insulation within a glovebag, per linear foot.
10. Removal of water cooler insulation within a glovebag, per linear foot.

NOTE 2: The Abatement Contractor shall remove these materials within negative pressure containment unless otherwise noted. Unit prices will include all mobilization, insurance, labor, notification etc. Unit costs will be used to credit the owner.

NOTE 3: The Contractor shall be required to vent negative air exhaust to the outdoors in order to provide the required -0.02" wg negative pressure. The asbestos abatement contractor will need to coordinate with the General Contractor to determine the best method to allow for this.

NOTE 4: The Contractor shall adequately secure all containments and prevent unauthorized entry through construction of lockable plywood/wood frame entrances/decon. These areas will be locked out when work is not occurring.

1.8 QUALITY CONTROLS

- A. The asbestos removal Contractor's superintendent shall be on the job each day during removal and he shall be knowledgeable, experienced and competent in this type of work.
- B. The asbestos removal Contractor shall be responsible for any damage to the building and its contents resulting from leakage or spillage of water.
- C. Authorities of the Commonwealth of Virginia shall be notified of the starting date of the asbestos removal project by the asbestos removal Contractor.
- D. The Owner reserves the right to halt the project work until hazardous or potentially hazardous conditions are corrected.
- E. The Owner reserves the right to independently perform such analysis and tests at any time as he deems necessary to ensure and protect safety of the project.

1.9 WORKER PROTECTION - ASBESTOS REMOVAL PROCEDURES & EQUIPMENT

- A. Comply with all EPA and OSHA Regulations, and follow EPA workplace guidelines.
- B. Provide and maintain negative air systems for all work areas, for the duration of asbestos removal work.
- C. Submit certificates signed by each employee indicating that the employee has received Virginia DPOR-approved training and is currently licensed in the Commonwealth of Virginia in the proper handling of materials that contain asbestos.
- D. All workers shall be instructed in and be knowledgeable of the following:
 - 1) The hazards of asbestos exposure.
 - 2) Use of respirators and protective clothing.
 - 3) Use of personal air monitoring equipment.
 - 4) Use of decontamination facilities and designated showers.
- E. Respiratory Equipment and Air Sampling Requirements

- 1) Provide workers with respiratory equipment in accordance with OSHA 1910.134, as suitable for the asbestos exposure in the work area.
 - 2) Provide sufficient filters for replacement of disposable type filters.
- F. Provide a copy of written respirator program on the job site at all times.
- G. Personnel breathing zone samples shall be made by the asbestos removal Contractor on a daily basis for determination of both 8-hour time weighted average (TWA) and ceiling concentrations of employee exposures.
- H. The sampling schedule shall be posted outside of the containment area showing sample frequency, duration of the sample, and pump flow rates.
- I. Results of all samples shall be posted within 24 hours of sampling outside of the containment area, and maintained there until the job has been concluded. This data shall include both the results of individual samples and the results of 8-hour TWA determinations. Posted results should include a synopsis of work activities of which the results are representative.

1.10 AIR MONITORING

- A. Provide air monitoring in the work areas throughout all asbestos stripping, removal and cleaning operations to ensure that the workers are adequately protected at all times. All personal air monitoring for OSHA compliance shall be the responsibility of the Contractor.
- B. Samples for air monitoring shall be collected by a competent person in accordance with methods prescribed in Chapter X of the Federal OSHA Industrial Hygiene Field Operations Manual or by equivalent procedures.
- C. Air monitoring shall be in compliance with 1910.1001 (f) of the OSHA standards.
- D. Air samples must be analyzed by NIOSH method 7400 by a laboratory accredited by AIHA.
- E. Air monitoring (protection of the Contractor's employees) shall be provided throughout the removal and cleaning operations. Air

monitoring shall be conducted and evaluated by a testing laboratory employed by the asbestos removal Contractor to ensure that the Contractor is complying with applicable EPA and OSHA regulations.

- F. Environmental samples outside of containment and clearance sampling shall be performed by the QP (Froehling & Robertson, Inc.).
- G. Area samples shall be collected outside the containment in areas of highest risk of contamination.
- H. Samples shall be made on a daily basis outside the containment.
- I. All analytical results shall be presented as signed "Certificates of Analysis". Form shall state:
 - Date and time sampling began.
 - Flow rate of samples.
 - Sampling time elapsed.
 - Concentration of fibers.
 - Site/individual sampled.
 - Signature of Analyst.
- J. Two copies of analytical results shall be delivered in writing to the job site within 24 hours of sample collection (excluding non-working days).
- K. Sampling schedules for area samples shall be posted outside the containment area showing sampling frequency, sample duration, and pump flow rates.
- L. Results of area samples made outside the containment shall be posted within 24 hours and maintained in the area showing the fiber concentrations. Posted results should include a synopsis of the day's activities of which the samples are representative.
- M. The Owner shall be informed immediately of any area samples outside the containment with results in excess of 0.01 fibers/cc.
- N. Copies of the results of all samples made in areas where Owner's employees are or may be exposed shall be given to the Owner to assure maintenance of records in compliance with OSHA standard 1910.1001 (i) (1).

- O. Operations shall be discontinued immediately at any time visible emissions are observed emanating from the containment.

PART 2 - PRODUCTS

2.1 PRODUCTS AND EQUIPMENT

- A. Protective plastic (polyethylene) sheeting of minimum 6-mil thickness and size to provide protection to all equipment, floors, walls, piping, ductwork, and all other exposed areas, with minimum frequency of joints.
- B. Seal tape shall be glass fiber or other type capable of sealing joints of adequate sheets of plastic for the attachment of plastic sheeting to finished or unfinished surfaces of dissimilar materials under either dry or wet conditions, including use of amended water.
- C. Disposal Containers: Bags and drums to be used for disposal of asbestos waste shall be suitable to receive and retain any asbestos-containing or contaminated materials until disposal at an EPA approved and certified waste disposal site. Bags shall be 6 mil thickness.
- D. Warning Labels: As required by OSHA Regulation 29 CFR 1910.1001 (g) (2).
- E. Surfactant (wetting agent for amended water): Acceptable surfactant.
- F. Encapsulant: Acceptable encapsulant

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolate the work areas for the duration of the work by completely sealing off all openings and fixtures in the work area with plastic sheeting taped and glued securely.
- B. Cover floor and wall surface with plastic sheeting sealed with tape and glue securely. Use a minimum of two layers of 6-mil plastic sheeting on floors. Cover floors first so that sheeting extends at least 12" [300 mm] up on walls, and then cover walls with minimum 6 mil plastic sheeting to

the floor level thus overlapping the floor material by a minimum of 12" [300 mm].

- C. Contractor shall provide the Outside Clean Room, Shower Room, and Equipment Room prior to start of work within building work areas. Personnel lockers in the Clean Room and facilities for disposal of contaminated clothing in the Equipment Room shall be provided. Egress openings shall consist of two sheets of plastic taped across the opening head and down opposite jambs, one leaf shall be taped on one side of the jamb, the other on the opposite jamb.
- D. - Containment partitions separating a contaminated area from a clean area shall be constructed of wood studs and two sheets of minimum 6-mil polyethylene plastic. The inner plastic barrier shall face the contaminated area, the outer barrier, and the clean area.
- E. Maintain enclosures in tidy conditions. Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning and end of each work period. Use smoke methods to test effectiveness of barriers.
- F. Each unit of asbestos filtration systems shall consist of a blower filter system, equipped with HEPA inline filtration that, as a minimum, continuously traps asbestos fibers of all sizes to 0.3 microns at 99.97% efficiency. Each unit shall be equipped with the following minimum controls:
 - 1) A warning light and audible alarm to indicate reduced air flow due to dirty filters.
 - 2) Automatic shut down, with warning light, to ensure against continued operation of units in event of clogged or damaged filters.
- G. The asbestos filtration system shall be in operation during all removal operations, until final clearance air samples are received. An adequate number of filtration units shall be used to assure maintenance of pressure differential of -0.02" w.c. In addition, filtration units shall be sized to provide a minimum of four air changes per hour in the containment area. Provide instrumentation to document pressure differential.

- H. Post the EPA and OSHA regulations or any applicable state and local government regulations at the job site in locations clearly visible to employees and others. Attention is directed to all requirements of the Contract Documents concerning precautionary procedures mandated thereby and by OSHA and EPA for the protection of personnel, the public, and the environment from exposure to or possible contamination by asbestos fibers.
- I. In addition to requirements for asbestos protection, comply with all other applicable requirements of 29 CFR 1910 and 1926.
- J. Provide hard hats, eye protection, and foot protection in those areas where such protective measures are required by OSHA regulations.
- K. Workers shall always wear a respirator properly fitted on the face while in the work area. Instruct and train workers to use respirators properly in accordance with the requirements of the American National Standards Practices for Respiratory Protection (ANSI Z88.2-1969). Ensure that workers wear the appropriate respirator at all times while in the work area. Each employee shall be tested for respirator fit in accordance with the cited ANSI standard.
- L. Workers shall wear disposable full body coveralls and disposable head and foot coverings in the work area. If non-disposable footwear such as protective shoes are required and disposal foot coverings are not suitable, the non-disposable protective footwear shall be left in the work area at all times until disposal at job completion, then disposed of as asbestos contaminated waste.
- M. The Contractor shall establish decontamination procedures for each work area. All persons without exception shall pass through these decontamination areas for any purpose. Procedures shall, as a minimum, consist of the following:
 - 1) Outside Clean room Area: In this room, the worker or individual shall remove normal street clothing and replace with clean work clothing, including disposable coveralls, respiratory protective equipment, and all other protective gear. No asbestos contaminated items shall enter this room with the exception of reusable respirators, which are to be placed in a bin, or other suitable receptacle approved by the Contractor's technical representative. Provide suitable lockers or other secure storage areas for the employee's clothing.

- 2) Showers: A shower room or similar facility shall be provided for transit by cleanly dressed workers entering the work area from the outside clean room, or by workers headed for the showers after undressing in the contaminated equipment room or area. Except in cases of emergency, no person shall leave a contaminated area without first having taken a shower. Propose methods by which the personal hygiene of workers or other persons involved can be monitored. Water from the showers shall be passed through 5-micron water filters and then piped into the building floor drain or collected and disposed of by the Contractor. Provide water for the showers. Cold water supply from existing system may be tapped by use of garden hoses, clamps and control valves. The taps and extensions shall be provided by the Contractor. The change facility shall be equipped with adequate water heating capacity to provide for hot water showers. The decontamination facility shall be equipped with a thermostatically controlled heating system for the clean room and equipment room.
- 3) Equipment Room: Provide an area in which work equipment, footwear and contaminated work clothing can be placed in suitable receptacles for reuse or disposal prior to entry into the shower room and thence to the outside clean room.
- 4) Decontamination Procedures: Submit to the Owner, a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from protective clothing and equipment prior to egress from the work area. Respiratory protective equipment shall be removed last, during shower, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas.

3.2 METHOD OF REMOVAL FOR ENCLOSED WORK AREAS

- A. A low-pressure fine spray of amended water shall be applied to reduce fiber release preceding removal. The asbestos shall be saturated sufficiently to retard emission of airborne fibers. If the asbestos is thick

and detaches in chunks having dry bottoms, amended water shall be sprayed over the material as it is loosened and removed.

- B. Following removal of asbestos-containing material, all plastic sheeting, tape, cleaning material, clothing and all other disposal materials or items used in the work area shall be packed into sealable plastic bags (6 mil minimum), sealed and placed into metal or fiber containers or skips for transport. The containers or skips shall be labeled as prescribed by OSHA Specifications 29 CFR 1910.1001 (g).
- C. All containers shall be cleaned and thoroughly decontaminated before leaving the work area by being passed through the shower, or through the airlock and container cleaning assembly, as follows:
 - 1) Containers shall first be gross-cleaned by vacuuming and then damp-wiped, before being placed into shower container or cleaning airlock.
 - 2) If a container being transferred from the work area via a shower has dried, it shall be wet-wiped again before being transferred past the shower.
- D. Transport the sealed container or skips to an EPA approved and certified waste disposal site. The Contractor shall provide the Owner with a signed certificate listing the quantity of materials delivered to the disposal site, a description of the location of the site, and a statement attesting to the fact that the site is an EPA and State approved disposal location. The signatures of the asbestos removal Contractor, transporter, and site operator must appear on the certificate. The Contractor shall ensure that the operator leaves damaged bags in the delivery containers and that the entire contaminated container is buried, however, sealed plastic bags may be dumped from the containers into the burial site and uncontaminated containers may be reused. The Contractor shall certify that any reused containers have not contained damaged or broken bags of asbestos or other asbestos-contaminated material.
- E. Disposal of all asbestos waste shall be at a prearranged disposal site in accordance with regulations of the Virginia Department of Environmental Quality-Waste Division and OSHA Regulation 29 C.F.R. 1910.1001.

3.3 DECONTAMINATION OF WORK AREA

- A. Replace pre-filter and the intermediate filter in the Air Filtration Device. Clean all surfaces of the Work Area, including the outside surface of critical barrier sheeting, tools, scaffolding and/or staging, by HEPA-filtered vacuuming, then damp cleaning and mopping. Do not dry-dust or dry-sweep. Continue cleaning until there is no visible dust, debris or residue on polyethylene sheeting and other surfaces.
- B. Perform a complete visual inspection of all Work Area surfaces and contents. If any debris or residue is found, repeat the first cleaning and continue decontamination procedure from that point.
- C. Allow sufficient time for the Work Area to completely dry while operating HEPA filtered fan units. Maintain operation of negative pressure differential system in operation during the drying period.
- D. The QP shall conduct a visual inspection of the Work Area when the abatement and decontamination is complete and when the Contractor's supervisor requests such inspection.
- E. After the visual inspection, an approved lock down encapsulant shall be applied to all the surfaces in the Work Area. The encapsulant used shall not impede reinsulation. After sufficient drying time, determined by the QP, the final clearance can take place.
- F. Additional cleaning required after the first final cleaning will be performed at the expense of the contractor. Additional hours required by the QP will also be an expense paid for by the Contractor, as well as necessary repeat final air clearance analyses.
- G. After final air samples are found to meet clearance criteria, remove critical barriers and completely dismantle and remove Decontamination Area.
- H. Seal HEPA filtered AFDs with 6-mil polyethylene sheeting and duct tape to form a tight seal at intake and before unit is moved from the Work Area.

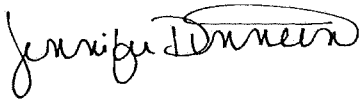
3.4 FINAL INSPECTION AND TESTING.

- A. After cleaning and decontamination of the workspace has been conducted, and if a high degree of cleanliness has been achieved, notify the QP that the workspace is ready for inspection and final testing. The QP will visually inspect each Work Area where such activity was conducted to determine whether the clean up has been properly

completed and to detect any visible asbestos dust or contamination. The QP shall conduct a visual inspection of the Work Area when the abatement and decontamination is complete and when the Contractor's supervisor requests such inspection. The visual inspection will be conducted in general accordance with ASTM E 1368-90, Standard Practice for Visual Inspection of Asbestos Abatement Projects.

- B. If the visual inspection does not reveal any dust or other signs of contamination, the final air monitoring will take place.
- C. Final air clearance testing shall be conducted by the QP using aggressive air sampling techniques in the Work Area in accordance with EPA 40 C.F.R. Part 763.90(i), (2, i) and Appendix A.
- D. Phase contrast microscopy analysis will be performed in accordance with NIOSH Method 7400. Final test results shall show contamination levels not to exceed 0.01 f/cc when using phase contrast microscopy (PCM). Air samples shall have a minimum volume of 1,200 liters per sample but may vary depending on size of Work Area and other variables.
- E. If elevated airborne fiber counts are detected on clearance samples, the Contractor will be responsible for re-cleaning of the sampled area(s) at no additional cost or schedule impact to Owner. Additional testing will be performed following the re-cleaning to document that acceptable levels have been achieved. The Contractor will be responsible for fees and expenses related to retesting the area after re-cleaning.

-- End of Section --



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SECTION 02080 Warsaw
ENGINEERING CONTROL OF ASBESTOS CONTAINING MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The GENERAL CONDITIONS (CO-7), SUPPLEMENTAL GENERAL CONDITIONS and DIVISION 1 GENERAL REQUIREMENTS, shall apply as fully as if included herein.

1.2 NOTES FOR DEMOLITION

- A. The Abatement Contractor shall coordinate with the Mechanical, Electrical, Plumbing, and General Contractors as necessary to ensure that all appropriate systems that will be impacted by demolition have been properly decommissioned prior to the start of any work.
- B. The Abatement Contractor shall coordinate with the General Contractor selected as necessary for this project to verify that the structure will support the planned activities and comply with local building codes and OSHA requirements.

1.3 WORK INCLUDED

- A. The work includes the furnishing of all labor, materials, equipment, insurance and services necessary for and reasonably incidental to the completion of asbestos removal and related work.
- B. Comply with all governing regulations, which the specifications supplement.
- C. Comply with DIVISION 1 GENERAL REQUIREMENT/Front End Section of this specification.

- D. All other work as herein specified. The Contractor will be responsible for obtaining any local, state, and federal permits, as appropriate for this project, prior to starting work. All permits, notifications, patent restrictions or requirements, whether specified in these specifications or not, are the sole responsibility of the Contractor performing the work described in these specifications. **Note:** If during the course of the contract, the Contractor is found to be not in compliance with the project specifications, the Contractor will stop all work until any deficiencies in his performance of this work are corrected. Standby time required to resolve any violations shall be at the Contractor's expense. Likewise, the Contractor will pay for any project delay that his violation causes the Building Owner. The contractor will also be back-charged by the Building Owner for any additional IH/project monitor site visits and/or additional analytical (and collection) fees resulting from poor work practices during removal **including failed final air samples.**

1.4 REGULATIONS

- A. All work shall conform to the requirements of the U. S. Environmental Protection Agency (EPA), U. S. Department of Labor - Occupational Safety and Health Administration (OSHA) and applicable State regulations relating to asbestos.
- B. The EPA and OSHA regulations shall be posted at the job site for the duration of the work; posting shall be in a location clearly visible to employees and others in the area.

1.5 DEFINITIONS

- A. Accredited/Accreditation: When referring to a person, Contractor or laboratory, means that such person is accredited in accordance with Section 206 of Title II of the Toxic Substances Control Act (AHERA Regulations).
- B. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
- C. Aggressive Sampling: High-activity level air sampling which results in all settled asbestos remaining airborne and uniformly disturbed through the use of special entrainment and mixing techniques. This makes any settled asbestos fibers accessible to the sampling filters for subsequent detection. The technique is described in 40 C.F.R. 763.90, Appendix A to Subpart E; and Guidance for Controlling ACM in Buildings, Appendix M.

- D. Air Filtration Device (AFD): Air filtration device (AFD) is part of the pressure differential system in which the air is filtered. The AFD is to be equipped with HEPA filters.
- E. Air Monitoring: The process of measuring the fiber content of a specific volume of air. NIOSH Method 7400 or TEM Method in 40 C.F.R. 763, Subpart E, Appendix A, will be used for sampling and analysis.
- F. Amended Water: Water to which a surfactant has been added.
- G. Approve: Where used in conjunction with the QP's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, "approved" will be held to limitations of QP's responsibilities and duties and does not release the Contractor from responsibilities to fulfill requirements of the Contract Documents. Approved shall also mean consent by U.S. EPA of training programs and the like.
- H. Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (asbestos), anthophyllite, and actinolite-tremolite. Both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered to be asbestos.
- I. Asbestos-Containing Material (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types.
- J. Asbestos-Containing Waste Material: Any material, which is or is suspected of being or any material contaminated with an asbestos-containing material, which is to be removed from a Work Area for disposal.
- K. Authorized Visitor: Personnel authorized by the Project Officer, testing lab personnel, or a representative of any Federal, State or local regulatory agency having authority over the project are considered authorized visitors.
- L. Barrier: Any surface that seals off the Work Area to inhibit the movement of fibers.
- M. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

- N. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- O. Certified Industrial Hygienist (CIH): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene.
- P. Critical Barrier: Two layers of 6 mil polyethylene sheeting on wall or three layers on floor, spray foam, or duct tape used to completely seal off the Work Area to prevent spread of fibers to surrounding areas.
- Q. Decontamination (Decon) Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower room and a clean room which is used for the decontamination of workers, materials and certain equipment contaminated with asbestos. This shall serve as the only entrance or exist to the Work Area.
- R. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- S. Disposal Bag: A 6-mil thick, leak-proof polyethylene bag used for transporting asbestos waste from the work area to the disposal site. Each is labeled in compliance with OSHA 1926.1101 as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

And U.S. DOT ORM-E label for Asbestos-Hazardous Material (including Asbestos Waste Manifest) and statements as required.

- T. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent release of fibers.
- U. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
- V. Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

- W. Removal Encapsulant: A penetrating encapsulant specifically designed for removal of asbestos-containing materials rather than for in situ encapsulation.
- X. Encapsulation: Treatment of ACM with an encapsulant.
- Y. Enclosure: The construction of an airtight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.
- Z. Filter: A media component used in respirators to remove solid or liquid particles from the respired air.
- AA. Friable Asbestos Material: Material that contains more than 1.0% asbestos by Polarized Light Microscopy (PLM), and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. This includes previously non-friable material which becomes damaged to the extent that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure.
- BB. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- CC. General Supervisor: Site Superintendent, Foreman: is the Contractor's representative at the work site. This person can be the Competent Person required by OSHA, 29 C.F.R. 1926.1101.
- DD. Glovebag: A sack (typically constructed to 6 mil transparent polyethylene) with two inward projecting long sleeve gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.
- EE. HEPA Filter: A high efficiency particulate air (HEPA) filter that removes from air 99.97% or more of monodispersed dioctylphthalate (DOP) or dioctylsebacate (DOS) particles having a mean particle diameter of 0.3 microns.
- FF. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): HEPA filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be 99.97% efficiency for retaining fibers of 0.3 microns or larger.

- GG. Indicated: The term "Indicated" is a cross-reference for Notes or Schedules on Drawings, to other paragraphs or Schedules in the Specifications, and to similar means of recording requirements in Contract Documents.
- HH. Install: Unless defined in greater detail, "install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working on dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- II. Installer: The "installer" is defined as the entity (person or firm) engaged by the Contractor or Sub-Contractor to perform a particular trade at the work site, including installation, erection, application and similar required operations. Such entities (installers) shall be expert in operations they perform.
- JJ. Landfill Receipt: Document signed by a landfill operator acknowledging the receipt of ACM waste.
- KK. Manifest: A document detailing chain of custody for ACM waste hauled.
- LL. Negative Pressure Glovebag: A glovebag that is composed of flexible plastic that can be subjected to negative pressure without collapsing.
- MM. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- NN. Permissible Exposure Limit (PEL): The Contractor shall ensure that no employee is exposed to an airborne fiber concentration of asbestos in excess of the PEL expressed as an 8-hour TWA as determined by the OSHA Reference Method of 29 C.F.R. 1926.1101 (Current PEL for asbestos is 0.1 fiber/cc.).
- OO. Personal Sampling Monitoring: Air samples taken in the breathing zone of workers as required by OSHA 29 C.F.R. 1926.1101.
- PP. Pressure Differential: Air pressure lower than surrounding areas, caused by exhausting air from a sealed space (Work Area).

- QQ. Pressure Differential System: A local exhaust system, utilizing HEPA filtration, capable of maintaining a pressure differential inside the Work Area and a constant airflow from adjacent areas into the Work Area and exhausting that filtered air outside the Work Area.
- RR. Project Manager (Contractor): The asbestos Contractor's employee responsible for the total oversight of the project.
- SS. Project Officer: The owner's employee responsible for overall contract administration.
- TT. Plasticize: Means to cover floors and walls with polyethylene sheeting as herein specified and in accordance with the temporary Enclosure Section.
- UU. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.
- VV. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.
- WW. Qualified Person (QP): A Registered Architect, Professional Engineer, or Certified Industrial Hygienist who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Management Planner, Project Monitor, and Asbestos Project Designer. The QP must be qualified to perform visual inspections as indicated in ASTM E 1368. The QP shall be appropriately licensed in the State of Virginia as a Project Monitor and Project Designer. **For this project, the QP shall be Mr. Christopher Chapman, CIH of Froehling & Robertson (804-264-2701) in Richmond, Virginia. However, if the Building Owner decides to hire another firm as the Project Monitor, then the contracted firm shall become the QP and will be responsible for any additional sampling and implementation and procedural recommendations and scope interpretations for the project.**
- XX. Regulated ACM: Means friable ACM, non-friable ACM that has become friable, non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading or non-friable ACM that has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the ACM during renovation or demolition.

- YY. Regulated Area: An area where asbestos removal operations are performed which is isolated by physical boundaries to prevent entry of unauthorized persons or the spread of asbestos dust, fibers or debris. Within this area, the airborne concentration of asbestos could reasonably be expected to exceed the PEL.
- ZZ. Removal: The taking out or stripping of all ACM from a damaged area or associated area or space.
- AAA. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.
- BBB. Short-Term Exposure Limit (STEL): A "ceiling" concentration, identified in OSHA regulations, of an airborne substance that shall not be exceeded for a duration of any 30-minute period (Current STEL for asbestos is 1.0 fiber/cc).
- CCC. Submittal: Items that is required to be presented to the Project Officer and/or the QP for review, consideration or decision.
- DDD. Surfacing Material: Material in a building that is sprayed-on, trowelled-on or otherwise applied to surfaces or structural members for acoustical, fireproofing or other purposes.
- EEE. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.
- FFF. Testing Laboratory: The "testing laboratory" is an independent entity to perform specific air sampling and analysis at the work site and associated areas, to report and (if required) interpret results. Analysis shall be performed by a laboratory accredited by the American Industrial Hygiene Association (AIHA) and having demonstrated a proficient rating in AIHA's Proficiency Analytical Testing (PAT) Program. The laboratory shall be licensed by the Virginia Department of Commerce as an Asbestos Analytical Laboratory. The laboratory shall also be accredited by the National Institute of Standards and Technology (NIST) through the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk sample analysis and air sample analysis by TEM (TEM Method of 40 C.F.R. 763, Subpart E, Appendix A).

- GGG. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.
- HHH. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed water vapor.
- III. Waste Shipment Record: Means the original shipping document, originated and signed by the waste generator (Abatement Contractor) used to track and substantiate the disposal of ACM waste as described in 40 CFR Part 61.
- JJJ. Waste Generator: Means the licensed Asbestos Abatement Contractor removing ACM waste from the property.
- KKK. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils that have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-containing waste.
- LLL. Work Area: The area where asbestos-related work or removal operations are performed; the Work Area is defined and/or isolated to prevent the spread of asbestos dust, fibers, or debris, and entry by unauthorized personnel. The Work Area is a Regulated Area as defined by 29 CFR 1926.1101.
- MMM. Work Site: The term "work site" is defined as the space available to the Contractor for performance of the work either exclusively or in conjunction with others performing other work as part of the project. The extent of project site is shown on the Drawings, and may or may not be identical with the description of land upon which the project is to be built.
- NNN. Negative Pressure Enclosure: Pressure differential of a minimum of -0.02 column inches of water as related to outside pressure. Utilization of a manometer shall be use as evidence.

ABBREVIATIONS AND NAMES:

The following acronyms or abbreviations referenced in Contract Documents are defined to mean the associated names. Both names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up-to-date as of the date of the Contract Documents:

ACM	Asbestos Containing Material
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, DC. 20006 (202) 626-7474
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018 (212) 354-3300
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103 (215) 299-5400
CFR	Code of Federal Regulations Available from Government Printing Office Washington, DC. 20402 (Usually first Published in Federal Register)
EPA	Environmental Protection Agency 401 M Street, SW Washington, DC. 20460 (202) 382-3949
f/cc	fibers per cubic centimeter
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology (U.S. Department of Commerce)

Gaithersburg, MD 20234
(301) 921-1000

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
Washington, DC. 20402

TEM Transmission Electron Microscopy

VA DPOR Virginia Department of Professional and Occupational Regulation
3600 West Broad Street
Richmond, Virginia 23230-4917
(804) 367-8500

UL Underwriters Laboratories
333 Pfinningsten Road
Northbrook, IL 60062

1.6 INFORMATION TO BE SUBMITTED AFTER CONTRACT IS AWARDED

A. Immediately upon award of the Contract, and before any work is commenced, Contractor shall submit for information of the Owner and Engineer the data listed below, and shall be in quantity to allow the Owner to retain two copies and the Engineer to retain one copy. The data shall show compliance with the requirements of the Contract Documents and governing regulations.

- 1) Method and means of removal and encapsulation of asbestos-containing materials.
- 2) Containment and shrouding procedures, including any unusual conditions.
- 3) Air sampling plan.
- 4) Name of laboratory to be used in air sample analysis and copy of American Industrial Hygiene Association (AIHA) Accreditation.
- 5) Location of change and decontamination area.
- 6) Location of landfill for disposal of asbestos waste that has been approved by EPA.

- 7) Manufacturer's technical data sheets on proposed surfactant, encapsulant, mastic removers, etc.
- 8) Certificate of Insurance with notarized statement thereon that all requirements stated in paragraphs 13 (a) through 13 (d) are covered.
- 9) Copies of Asbestos Worker's License and Asbestos Supervisors License.
- 10) Copies of Asbestos Worker's and Asbestos Supervisors medical clearance for asbestos/respirator use.
- 11) Notifications to all appropriate state and federal agencies and local fire and police departments.

1.7 SCOPE OF WORK

- A. The Scope of Work includes, but is not necessarily limited, to the following:
 - 1) The Abatement Contractor shall be responsible for removal of all asbestos-containing materials impacted by this project based on the drawings provided to F&R dated November 5, 2009. These materials include vinyl floor tiles and associated mastic, laboratory benches, laboratory hoods, vinyl cove base and associated mastic, roof flashings, and roof flashing caulk.
 - 2) The Abatement Contractor has the responsibility for determining actual quantities of materials to be removed and reviewing the scope of work. The Contractor should allow under their base bid for the removal of all materials as referenced in this specification. **All presumed/newly discovered asbestos-containing materials (PACM) shall be tested prior to removal by the Owner's project monitor. The Abatement Contractor shall not remove any of the PACM/newly discovered ACMs without the approval of the QP or the owner's representative. The Owner's representative or QP will verify quantities as they are removed. Any quantities less than the amounts estimated by the Abatement Contractor will be credited to The Owner.**

- 3) All mobilizations and permit notifications shall be the Abatement Contractors responsibility.
- 4) This section includes all work necessary to reduce air concentrations of asbestos to the specified level and maintain the specified asbestos control limits during the life of the contract. It also contains removal, containment, and disposal of asbestos-containing materials. The work specified in this document consists of the provision of services for the removal and disposal of asbestos-containing building materials (ACBMs). Asbestos materials have been identified in the areas where work will be performed.
- 5) All asbestos abatement work will be performed by competent, licensed (by the Virginia Department of Professional and Occupational Regulation) persons trained, qualified, and knowledgeable in the techniques of abatement, handling, and disposal of ACBMs and materials contaminated by asbestos, in accordance with pertinent local, state, and federal regulations.
- 6) The Abatement Contractor shall remove the following materials as part of the base bid:
 - a) All asbestos containing floor tiles and associated mastic (some present under carpet) that will be impacted during planned renovation located throughout the renovation areas. Approximately 26,750 square feet of flooring materials. Floor plans have also been attached to this specification indicating areas to be abated. Note 1: **As part of the base bid, the Abatement Contractor shall remove all layers of floor tiles and mastic and any associated carpeting.** Note 2: The Abatement Contractor shall be responsible for removal of all VAT and mastic under carpets, partition walls, fixtures, cabinets, and other furnishings and obstructions where directed by the owner to remove these materials as part of the base bid. Note 3: The Abatement Contractor shall remove these materials within a negative pressure containment as described in Part 3 – Execution of this document.
 - b) All asbestos containing vinyl cove base and associated mastic that will be impacted during planned renovation located throughout the renovation areas. Approximately 8,170 linear feet of cove base materials. Note 1: **As part of the base bid,**

the Abatement Contractor shall remove all vinyl cove base and associated mastic to be impacted by the planned renovation. Note 2: The Abatement Contractor shall remove these materials within a negative pressure containment as described in Part 3 – Execution of this document in association with floor tile and mastic removal.

- c) All asbestos containing laboratory benches and all associated adhesives that will be impacted during planned renovation located throughout the renovation areas. Approximately 950 square feet of laboratory benches and adhesives. Note 1: **As part of the base bid, the Abatement Contractor shall remove all laboratory benches and associated adhesives.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.
- d) All asbestos containing laboratory hoods and associated piping that will be impacted during planned renovation located throughout the renovation areas. Approximately 2 laboratory hoods. Note 1: **As part of the base bid, the Abatement Contractor shall remove all laboratory hoods and associated piping.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.
- e) All asbestos containing roof flashing and all associated roof caulking that will be impacted during planned renovation of this building. Approximately 2,800 linear feet of roof flashing/caulkings. Note 1: **As part of the base bid, the Abatement Contractor shall remove all roof flashing/caulking to be impacted by the planned renovation.** Note 2: The Abatement Contractor shall remove these materials intact as described in Part 3 – Execution of this document.

GENERAL NOTES:

NOTE 1: The Abatement Contractor shall submit unit cost estimates for the following items:

- 1. Removal of asbestos-containing flooring materials (including floor tiles, vinyl sheeting, carpet and associated mastic) within negative pressure containment, per square foot.

2. Removal of asbestos-containing flooring materials (including floor tiles, carpet, and associated mastic) intact, per square foot.
3. Removal of asbestos-containing vinyl cove base and associated mastic within negative pressure containment, per linear foot.
4. Removal of asbestos-containing laboratory benches/adhesives intact, per square foot.
5. Removal of asbestos-containing laboratory hoods and associated piping intact, per hood.
6. Removal of asbestos-containing roof flashings/caulkings intact, per linear foot.
7. Removal of asbestos-containing pipe insulation/mastics within a glovebag, per linear foot.
8. Removal of fan coil insulation within a glovebag, per linear foot.
9. Removal of water cooler insulation within a glovebag, per linear foot.

NOTE 2: The Abatement Contractor shall remove these materials within negative pressure containment unless otherwise noted. Unit prices will includes all mobilization, insurance, labor, notification etc. Unit costs will be used to credit the owner.

NOTE 3: The Contractor shall be required to vent negative air exhaust to the outdoors in order to provide the required 0.02" w.g. negative pressure. The asbestos abatement contractor will need to coordinate with the General Contractor to determine the best method to allow for this.

NOTE 4: The Contractor shall adequately secure all containments and prevent unauthorized entry through construction of lockable plywood/wood frame entrances/decon. These areas will be locked out when work is not occurring.

1.8 QUALITY CONTROLS

- A. The asbestos removal Contractor's superintendent shall be on the job each day during removal and he shall be knowledgeable, experienced and competent in this type of work.
- B. The asbestos removal Contractor shall be responsible for any damage to the building and its contents resulting from leakage or spillage of water.

- C. Authorities of the Commonwealth of Virginia shall be notified of the starting date of the asbestos removal project by the asbestos removal Contractor.
- D. The Owner reserves the right to halt the project work until hazardous or potentially hazardous conditions are corrected.
- E. The Owner reserves the right to independently perform such analysis and tests at any time as he deems necessary to ensure and protect safety of the project.

1.9 WORKER PROTECTION - ASBESTOS REMOVAL PROCEDURES & EQUIPMENT

- A. Comply with all EPA and OSHA Regulations, and follow EPA workplace guidelines.
- B. Provide and maintain negative air systems for all work areas, for the duration of asbestos removal work.
- C. Submit certificates signed by each employee indicating that the employee has received Virginia DPOR-approved training and is currently licensed in the Commonwealth of Virginia in the proper handling of materials that contain asbestos.
- D. All workers shall be instructed in and be knowledgeable of the following:
 - 1) The hazards of asbestos exposure.
 - 2) Use of respirators and protective clothing.
 - 3) Use of personal air monitoring equipment.
 - 4) Use of decontamination facilities and designated showers.
- E. Respiratory Equipment and Air Sampling Requirements
 - 1) Provide workers with respiratory equipment in accordance with OSHA 1910.134, as suitable for the asbestos exposure in the work area.
 - 2) Provide sufficient filters for replacement of disposable type filters.

- F. Provide a copy of written respirator program on the job site at all times.
- G. Personnel breathing zone samples shall be made by the asbestos removal Contractor on a daily basis for determination of both 8-hour time weighted average (TWA) and ceiling concentrations of employee exposures.
- H. The sampling schedule shall be posted outside of the containment area showing sample frequency, duration of the sample, and pump flow rates.
- I. Results of all samples shall be posted within 24 hours of sampling outside of the containment area, and maintained there until the job has been concluded. This data shall include both the results of individual samples and the results of 8-hour TWA determinations. Posted results should include a synopsis of work activities of which the results are representative.

1.10 AIR MONITORING

- A. Provide air monitoring in the work areas throughout all asbestos stripping, removal and cleaning operations to ensure that the workers are adequately protected at all times. All personal air monitoring for OSHA compliance shall be the responsibility of the Contractor.
- B. Samples for air monitoring shall be collected by a competent person in accordance with methods prescribed in Chapter X of the Federal OSHA Industrial Hygiene Field Operations Manual or by equivalent procedures.
- C. Air monitoring shall be in compliance with 1910.1001 (f) of the OSHA standards.
- D. Air samples must be analyzed by NIOSH method 7400 by a laboratory accredited by AIHA.
- E. Air monitoring (protection of the Contractor's employees) shall be provided throughout the removal and cleaning operations. Air monitoring shall be conducted and evaluated by a testing laboratory employed by the asbestos removal Contractor to ensure that the Contractor is complying with applicable EPA and OSHA regulations.
- F. Environmental samples outside of containment and clearance sampling shall be performed by the QP (Froehling & Robertson, Inc.).

- G. Area samples shall be collected outside the containment in areas of highest risk of contamination.
- H. Samples shall be made on a daily basis outside the containment.
- I. All analytical results shall be presented as signed "Certificates of Analysis". Form shall state:
 - Date and time sampling began.
 - Flow rate of samples.
 - Sampling time elapsed.
 - Concentration of fibers.
 - Site/individual sampled.
 - Signature of Analyst.
- J. Two copies of analytical results shall be delivered in writing to the job site within 24 hours of sample collection (excluding non-working days).
- K. Sampling schedules for area samples shall be posted outside the containment area showing sampling frequency, sample duration, and pump flow rates.
- L. Results of area samples made outside the containment shall be posted within 24 hours and maintained in the area showing the fiber concentrations. Posted results should include a synopsis of the day's activities of which the samples are representative.
- M. The Owner shall be informed immediately of any area samples outside the containment with results in excess of 0.01 fibers/cc.
- N. Copies of the results of all samples made in areas where Owner's employees are or may be exposed shall be given to the Owner to assure maintenance of records in compliance with OSHA standard 1910.1001 (i) (1).
- O. Operations shall be discontinued immediately at any time visible emissions are observed emanating from the containment.

PART 2 - PRODUCTS

2.1 PRODUCTS AND EQUIPMENT

- A. Protective plastic (polyethylene) sheeting of minimum 6-mil thickness and size to provide protection to all equipment, floors, walls, piping, ductwork, and all other exposed areas, with minimum frequency of joints.
- B. Seal tape shall be glass fiber or other type capable of sealing joints of adequate sheets of plastic for the attachment of plastic sheeting to finished or unfinished surfaces of dissimilar materials under either dry or wet conditions, including use of amended water.
- C. Disposal Containers: Bags and drums to be used for disposal of asbestos waste shall be suitable to receive and retain any asbestos-containing or contaminated materials until disposal at an EPA approved and certified waste disposal site. Bags shall be 6 mil thickness.
- D. Warning Labels: As required by OSHA Regulation 29 CFR 1910.1001 (g) (2).
- E. Surfactant (wetting agent for amended water): Acceptable surfactant.
- F. Encapsulant: Acceptable encapsulant

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Isolate the work areas for the duration of the work by completely sealing off all openings and fixtures in the work area with plastic sheeting taped and glued securely.
- B. Cover floor and wall surface with plastic sheeting sealed with tape and glue securely. Use a minimum of two layers of 6-mil plastic sheeting on floors. Cover floors first so that sheeting extends at least 12" [300 mm] up on walls, then cover walls with minimum 6 mil plastic sheeting to the floor level thus overlapping the floor material by a minimum of 12" [300 mm].
- C. Contractor shall provide the Outside Clean Room, Shower Room, and Equipment Room prior to start of work within building work areas. Personnel lockers in the Clean Room and facilities for disposal of contaminated clothing in the Equipment Room shall be provided. Egress

openings shall consist of two sheets of plastic taped across the opening head and down opposite jambs, one leaf shall be taped on one side of the jamb, the other on the opposite jamb.

- D. Containment partitions separating a contaminated area from a clean area shall be constructed of wood studs and two sheets of minimum 6-mil polyethylene plastic. The inner plastic barrier shall face the contaminated area, the outer barrier, and the clean area.
- E. Maintain enclosures in tidy conditions. Ensure that barriers and plastic linings are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning and end of each work period. Use smoke methods to test effectiveness of barriers.
- F. Each unit of asbestos filtration systems shall consist of a blower filter system, equipped with HEPA inline filtration that, as a minimum, continuously traps asbestos fibers of all sizes to 0.3 microns at 99.97% efficiency. Each unit shall be equipped with the following minimum controls:
 - 1) A warning light and audible alarm to indicate reduced air flow due to dirty filters.
 - 2) Automatic shut down, with warning light, to ensure against continued operation of units in event of clogged or damaged filters.
- G. The asbestos filtration system shall be in operation during all removal operations, until final clearance air samples are received. An adequate number of filtration units shall be used to assure maintenance of pressure differential of -0.02" w.c. In addition, filtration units shall be sized to provide a minimum of four air changes per hour in the containment area. Provide instrumentation to document pressure differential.
- H. Post the EPA and OSHA regulations or any applicable state and local government regulations at the job site in locations clearly visible to employees and others. Attention is directed to all requirements of the Contract Documents concerning precautionary procedures mandated thereby and by OSHA and EPA for the protection of personnel, the public, and the environment from exposure to or possible contamination by asbestos fibers.

- I. In addition to requirements for asbestos protection, comply with all other applicable requirements of 29 CFR 1910 and 1926.
- J. Provide hard hats, eye protection, and foot protection in those areas where such protective measures are required by OSHA regulations.
- K. Workers shall always wear a respirator properly fitted on the face while in the work area. Instruct and train workers to use respirators properly in accordance with the requirements of the American National Standards Practices for Respiratory Protection (ANSI Z88.2-1969). Ensure that workers wear the appropriate respirator at all times while in the work area. Each employee shall be tested for respirator fit in accordance with the cited ANSI standard.
- L. Workers shall wear disposable full body coveralls and disposable head and foot coverings in the work area. If non-disposable footwear such as protective shoes are required and disposal foot coverings are not suitable, the non-disposable protective footwear shall be left in the work area at all times until disposal at job completion, then disposed of as asbestos contaminated waste.
- M. The Contractor shall establish decontamination procedures for each work area. All persons without exception shall pass through these decontamination areas for any purpose. Procedures shall, as a minimum, consist of the following:
 - 1) Outside Clean room Area: In this room, the worker or individual shall remove normal street clothing and replace with clean work clothing, including disposable coveralls, respiratory protective equipment, and all other protective gear. No asbestos contaminated items shall enter this room with the exception of reusable respirators, which are to be placed in a bin, or other suitable receptacle approved by the Contractor's technical representative. Provide suitable lockers or other secure storage areas for the employee's clothing.
 - 2) Showers: A shower room or similar facility shall be provided for transit by cleanly dressed workers entering the work area from the outside clean room, or by workers headed for the showers after undressing in the contaminated equipment room or area. Except in cases of emergency, no person shall leave a contaminated area without first having taken a shower. Propose

methods by which the personal hygiene of workers or other persons involved can be monitored. Water from the showers shall be passed through 5-micron water filters and then piped into the building floor drain or collected and disposed of by the Contractor. Provide water for the showers. Cold water supply from existing system may be tapped by use of garden hoses, clamps and control valves. The taps and extensions shall be provided by the Contractor. The change facility shall be equipped with adequate water heating capacity to provide for hot water showers. The decontamination facility shall be equipped with a thermostatically controlled heating system for the clean room and equipment room.

- 3) Equipment Room: Provide an area in which work equipment, footwear and contaminated work clothing can be placed in suitable receptacles for reuse or disposal prior to entry into the shower room and thence to the outside clean room.
- 4) Decontamination Procedures: Submit to the Owner, a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from protective clothing and equipment prior to egress from the work area. Respiratory protective equipment shall be removed last, during shower, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas.

3.2 METHOD OF REMOVAL FOR ENCLOSED WORK AREAS

- A. A low-pressure fine spray of amended water shall be applied to reduce fiber release preceding removal. The asbestos shall be saturated sufficiently to retard emission of airborne fibers. If the asbestos is thick and detaches in chunks having dry bottoms, amended water shall be sprayed over the material as it is loosened and removed.
- B. Following removal of asbestos-containing material, all plastic sheeting, tape, cleaning material, clothing and all other disposal materials or items used in the work area shall be packed into sealable plastic bags (6 mil minimum), sealed and placed into metal or fiber containers or skips for

transport. The containers or skips shall be labeled as prescribed by OSHA Specifications 29 CFR 1910.1001 (g).

- C. All containers shall be cleaned and thoroughly decontaminated before leaving the work area by being passed through the shower, or through the airlock and container cleaning assembly, as follows:
 - 1) Containers shall first be gross-cleaned by vacuuming and then damp-wiped, before being placed into shower container or cleaning airlock.
 - 2) If a container being transferred from the work area via a shower has dried, it shall be wet-wiped again before being transferred past the shower.
- D. Transport the sealed container or skips to an EPA approved and certified waste disposal site. The Contractor shall provide the Owner with a signed certificate listing the quantity of materials delivered to the disposal site, a description of the location of the site, and a statement attesting to the fact that the site is an EPA and State approved disposal location. The signatures of the asbestos removal Contractor, transporter, and site operator must appear on the certificate. The Contractor shall ensure that the operator leaves damaged bags in the delivery containers and that the entire contaminated container is buried, however, sealed plastic bags may be dumped from the containers into the burial site and uncontaminated containers may be reused. The Contractor shall certify that any reused containers have not contained damaged or broken bags of asbestos or other asbestos-contaminated material.
- E. Disposal of all asbestos waste shall be at a prearranged disposal site in accordance with regulations of the Virginia Department of Environmental Quality-Waste Division and OSHA Regulation 29 C.F.R. 1910.1001.

3.3 DECONTAMINATION OF WORK AREA

- A. Replace pre-filter and the intermediate filter in the Air Filtration Device. Clean all surfaces of the Work Area, including the outside surface of critical barrier sheeting, tools, scaffolding and/or staging, by HEPA-filtered vacuuming, then damp cleaning and mopping. Do not dry-dust or dry-sweep. Continue cleaning until there is no visible dust, debris or residue on polyethylene sheeting and other surfaces.

- B. Perform a complete visual inspection of all Work Area surfaces and contents. If any debris or residue is found, repeat the first cleaning and continue decontamination procedure from that point.
- C. Allow sufficient time for the Work Area to completely dry while operating HEPA filtered fan units. Maintain operation of negative pressure differential system in operation during the drying period.
- D. The QP shall conduct a visual inspection of the Work Area when the abatement and decontamination is complete and when the Contractor's supervisor requests such inspection.
- E. After the visual inspection, an approved lock down encapsulant shall be applied to all the surfaces in the Work Area. The encapsulant used shall not impede reinsulation. After sufficient drying time, determined by the QP, the final clearance can take place.
- F. Additional cleaning required after the first final cleaning will be performed at the expense of the contractor. Additional hours required by the QP will also be an expense paid for by the Contractor, as well as necessary repeat final air clearance analyses.
- G. After final air samples are found to meet clearance criteria, remove critical barriers and completely dismantle and remove Decontamination Area.
- H. Seal HEPA filtered AFDs with 6-mil polyethylene sheeting and duct tape to form a tight seal at intake and before unit is moved from the Work Area.

3.4 FINAL INSPECTION AND TESTING.

- A. After cleaning and decontamination of the workspace has been conducted, and if a high degree of cleanliness has been achieved, notify the QP that the workspace is ready for inspection and final testing. The QP will visually inspect each Work Area where such activity was conducted to determine whether the clean up has been properly completed and to detect any visible asbestos dust or contamination. The QP shall conduct a visual inspection of the Work Area when the abatement and decontamination is complete and when the Contractor's supervisor requests such inspection. The visual inspection will be conducted in general accordance with ASTM E 1368-90, Standard Practice for Visual Inspection of Asbestos Abatement Projects.

- B. If the visual inspection does not reveal any dust or other signs of contamination, the final air monitoring will take place.
- C. Final air clearance testing shall be conducted by the QP using aggressive air sampling techniques in the Work Area in accordance with EPA 40 C.F.R. Part 763.90(i), (2, i) and Appendix A.
- D. Phase contrast microscopy analysis will be performed in accordance with NIOSH Method 7400. Final test results shall show contamination levels not to exceed 0.01 f/cc when using phase contrast microscopy (PCM). Air samples shall have a minimum volume of 1,200 liters per sample but may vary depending on size of Work Area and other variables.
- E. If elevated airborne fiber counts are detected on clearance samples, the Contractor will be responsible for re-cleaning of the sampled area(s) at no additional cost or schedule impact to Owner. Additional testing will be performed following the re-cleaning to document that acceptable levels have been achieved. The Contractor will be responsible for fees and expenses related to retesting the area after re-cleaning.

-- End of Section --

**SECTION 02081 Glens
REMOVAL AND DISPOSAL OF LEAD-CONTAINING PAINT INCIDENTAL TO GENERAL
CONSTRUCTION/RENOVATION ACTIVITIES**

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z9.2	(1979; R 1991) Fundamentals Governing the Design and Operation of Local Exhaust Systems
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ANSI Z88.2	(1992) Respiratory Protection
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CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1926.21	Safety Training and Education
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29 CFR 1926.33	Access to Employee Exposure and Medical Records
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29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
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29 CFR 1926.59	Hazard Communication
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29 CFR 1926.62	Lead Exposure in Construction
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29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
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29 CFR 1926.103	Respiratory Protection
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40 CFR 260	Hazardous Waste Management Systems: General
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40 CFR 261	Identification and Listing of Hazardous Waste
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40 CFR 262	Generators of Hazardous Waste
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40 CFR 263	Transporters of Hazardous Waste
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40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
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40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
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40 CFR 268	Land Disposal Restrictions
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40 CFR 745	Lead; Requirements for Lead-Based Paint Activities
49 CFR 172	Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD Guidelines	(1995) Guidelines for the Evaluation and Control of Lead Based Paint Hazards in Housing
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UNDERWRITERS LABORATORIES INC. (UL)

UL 586	(1996) High-Efficiency, Particulate, Air Filter Units
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1.2 DEFINITIONS

1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period in an occupational/industrial environment.

1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries that is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.

1.2.3 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations.

1.2.4 Contaminated Room

Room for removal of contaminated personal protective equipment (PPE).

1.2.5 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.6 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

1.2.7 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

1.2.8 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps.

1.2.9 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligram per centimeter squared or 0.5 percent by weight.

1.2.10 Lead-Based Paint Hazard (LBP Hazard)

Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

1.2.11 Lead-Containing Paint (LCP)

Lead-based paint or other similar surface coating containing lead or lead compound in excess of 0.06 percent by weight of the total nonvolatile content of the paint.

1.2.12 Lead Control Area

An enclosed area or structure, constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of lead-based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.

1.2.13 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula:

$$\text{PEL (micrograms/cubic meter of air)} = 400/\text{No. Hours worked per day}$$

1.2.14 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.15 Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside boundary."

1.3 LEAD HAZARD AWARENESS

1.3.1 Lead-Based Paint

The Contractor shall assume that all surfaces shall contain Lead-Based Paint (LBP) or Lead Containing Paint (LCP).

The Contractors shall complete all renovation / demolition work in accordance with the requirements found in 29 CFR 1926.62. Submit documentation of compliance with this standard to The Owner prior to start-up of work, including an air monitoring plan, dust control measures, etc. All compliance sampling and other control measures for potential lead dust shall be addressed within exposure control and monitoring plan prepared by the Contractor and signed off on by a CIH. All compliance sampling shall be performed by individuals working under the direction of the Contractor's Competent Person. Following completion of work, submit all monitoring documentation to the Contracting Officer. The Owner may elect to do independent sampling.

1.4 PERSONNEL PROTECTION

1.4.1 Equipment

The Contractor shall provide adequate personal protective equipment (PPE) to any employees working on lead coated surfaces if there is a potential for generation of airborne lead dust or fume (e.g., through grinding, cutting, sanding, etc.) above the Permissible Exposure Limit (29 CFR 1926.62). Note: The standard does not reference a specific level of lead in paint at which a hazard exists. Rather, OSHA defines airborne concentrations, and references specific types of work practices and operations from which a lead hazard may be generated (29 CFR 1926.62, paragraph d).

1.4.2 Exposure Monitoring

The Contractor should make allowances in the bid price for the cost of environmental and personnel monitoring, along with costs for provision of all other related services, monitoring, and/or equipment needed to comply with requirements found within 29 CFR 1926.62. The Contractor shall be required to conduct personnel air monitoring to establish personal exposure levels. This monitoring information will be used by the Contractor to determine the levels of personnel protection and environmental controls (if necessary) required to be used by the Contractor for this contract. Monitoring shall be performed under the direction of the Competent Person. The costs for PPE, monitoring, decontamination facilities, etc. shall be borne by the Contractor. The Contractor shall also be required to conduct air monitoring during the course of the project to document airborne lead levels.

1.5 WASTE DISPOSAL

It is expected that waste debris will be generated by this project, which may contain lead coated surfaces. The Owner or their representative shall perform testing services to determine proper disposal, in accordance with EPA hazardous waste disposal requirements found in 40 CFR 260 - 264. The Contractor shall be responsible for disposal of all materials generated at the site. The Contractor is

responsible for notifying all other parties who may receive this waste that it may have lead-coated surfaces.

PART 2 PRODUCTS

Section not used.

PART 3 EXECUTION

Section not used.

-- End Of Section --

SECTION 02081 Warsaw
REMOVAL AND DISPOSAL OF LEAD-CONTAINING PAINT INCIDENTAL TO GENERAL
CONSTRUCTION/RENOVATION ACTIVITIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred within the text by the basic designation only.

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29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead Exposure in Construction
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29 CFR 1926.103	Respiratory Protection
40 CFR 260	Hazardous Waste Management Systems: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions

40 CFR 745	Lead; Requirements for Lead-Based Paint Activities
49 CFR 172	Hazardous Materials, Tables, and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

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1.2 DEFINITIONS

1.2.1 Action Level

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1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries that is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.

1.2.3 Competent Person (CP)

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations.

1.2.4 Contaminated Room

Room for removal of contaminated personal protective equipment (PPE).

1.2.5 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.6 Eight-Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

1.2.7 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

1.2.8 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps.

1.2.9 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligram per centimeter squared or 0.5 percent by weight.

1.2.10 Lead-Based Paint Hazard (LBP Hazard)

Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

1.2.11 Lead-Containing Paint (LCP)

Lead-based paint or other similar surface coating containing lead or lead compound in excess of 0.06 percent by weight of the total nonvolatile content of the paint.

1.2.12 Lead Control Area

An enclosed area or structure, constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of lead-based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.

1.2.13 Lead Permissible Exposure Limit (PEL)

Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula:

$$\text{PEL (micrograms/cubic meter of air)} = 400/\text{No. Hours worked per day}$$

1.2.14 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.15 Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside boundary."

1.3 LEAD HAZARD AWARENESS

1.3.1 Lead-Based Paint

The Contractor shall assume that all surfaces shall contain Lead-Based Paint (LBP) or Lead Containing Paint (LCP).

The Contractors shall complete all renovation / demolition work in accordance with the requirements found in 29 CFR 1926.62. Submit documentation of compliance with this standard to The Owner prior to start-up of work, including an air monitoring plan, dust control measures, etc. All compliance sampling and other control measures for potential lead dust shall be addressed within exposure control and monitoring plan prepared by the Contractor and signed off on by a CIH. All compliance sampling shall be performed by individuals working under the direction of the Contractor's Competent Person. Following completion of work, submit all monitoring documentation to the Contracting Officer. The Owner may elect to do independent sampling.

1.4 PERSONNEL PROTECTION

1.4.1 Equipment

The Contractor shall provide adequate personal protective equipment (PPE) to any employees working on lead coated surfaces if there is a potential for generation of airborne lead dust or fume (e.g., through grinding, cutting, sanding, etc.) above the Permissible Exposure Limit (29 CFR 1926.62). Note: The standard does not reference a specific level of lead in paint at which a hazard exists. Rather, OSHA defines airborne concentrations, and references specific types of work practices and operations from which a lead hazard may be generated (29 CFR 1926.62, paragraph d).

1.4.2 Exposure Monitoring

The Contractor should make allowances in the bid price for the cost of environmental and personnel monitoring, along with costs for provision of all other related services, monitoring, and/or equipment needed to comply with requirements found within 29 CFR 1926.62. The Contractor shall be required to conduct personnel air monitoring to establish personal exposure levels. This monitoring information will be used by the Contractor to determine the levels of personnel protection and environmental controls (if necessary) required to be used by the Contractor for this contract. Monitoring shall be performed under the direction of the Competent Person. The costs for PPE, monitoring, decontamination facilities, etc. shall be borne by the Contractor. The Contractor shall also be required to conduct air monitoring during the course of the project to document airborne lead levels.

1.5 WASTE DISPOSAL

It is expected that waste debris will be generated by this project, which may contain lead coated surfaces. The Owner or their representative shall perform testing services to determine proper disposal, in accordance with EPA hazardous waste disposal requirements found in 40 CFR 260 - 264. The Contractor shall be responsible for disposal of all materials generated at the site. The Contractor is

responsible for notifying all other parties who may receive this waste that it may have lead-coated surfaces.

PART 2 PRODUCTS

Section not used.

PART 3 EXECUTION

Section not used.

-- End Of Section --

**SECTION 02084 Glenns
REMOVAL OF BUILDING COMPONENTS CONTAINING PCBs AND MERCURY**

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000	Air Contaminants
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
49 CFR 172	Hazardous Materials, Table, and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

VIRGINIA ADMINISTRATIVE CODE (VAC)

9 VAC 20-60	Hazardous Waste Regulations
9 VAC 20-80	Solid Waste Management Regulations

1.2 REQUIREMENTS

Removal and disposal of PCB containing light ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB light ballasts during renovation.

1.2.1 Scope of Work

The Contractor has the responsibility for determining actual quantities of materials to be removed and reviewing the scope of work. No additional contract price adjustments will be allowed due to variances between actual quantities and the estimated quantities listed herein (unless otherwise specified in this document). The Contractor should allow under their base bid for the removal of all materials as described in the survey report and/or referenced in this specification based on renovation drawings provided to F&R dated November 5, 2009.

The Contractor shall be responsible for removal of the following as part of the base bid:

- A. PCB containing light ballasts (approximately 715)
- B. Mercury containing fluorescent light lamps (approximately 1,529)
- C. Mercury containing wall and mechanical thermostats (approximately 34)
- D. Unit cost (per linear foot) for removal and disposal of PCB caulking

Note: The Abatement Contractor shall coordinate with the Electrical and General Contractors to ensure that all appropriate systems that will be impacted by demolition have been properly decommissioned prior to the start of any work.

1.3 DEFINITIONS

1.3.1 Certified Industrial Hygienist (CIH)

An industrial hygienist who shall be certified by the American Board of Industrial Hygiene.

1.3.2 Leak

Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

1.3.3 Mercury-Containing Lamps

As used in this specification shall mean all fluorescent and high-intensity discharge (HID) lamps scheduled for demolition and/or removal as indicated in the Contract documents that:

- a. Fails the TCLP test for mercury, or
- b. According to the Manufacturer, would fail the TCLP test for mercury
- c. By calculation of equivalent TCLP mercury level from total metal analysis would fail the TCLP test for mercury.

1.3.4 Polychlorinated Biphenyls (PCBs)

PCBs as used in this specification shall mean the same as PCBs, PCB containing lighting ballast, and PCB container, as defined in 40 CFR 761, Section 3, Definitions or PCB containing caulking.

1.3.5 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

Perform PCB related work in accordance with 40 CFR 761, 9 VAC 20-60, and 9 VAC 20-80. Perform mercury-containing lamps storage and transport in accordance with 40 CFR 262, 40 CFR 263, 9 VAC 20-60, and 9 VAC 20-80.

1.4.2 Training

All workers shall have training in accordance with 29 CFR 1910.140 (HAZWOPR). The instruction shall include: The dangers of PCB and mercury exposure, decontamination, safe work practices, and applicable OSHA and EPA regulations. The Owner or their representative shall review and approve the PCB and Mercury-Containing Lamp Removal Work Plans.

1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 761, 40 CFR 262, 40 CFR 263, 9 VAC 20-60, 9 VAC 20-80 and of the Contractor removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

1.5 SUBMITTALS

Submit two copies of the following documentation:

Certificates

Training Certification

PCB and Mercury-Containing Lamp Removal Work Plan

PCB and Mercury-Containing Lamp Disposal Plan

Closeout Submittals

Transporter certification of notification to EPA of their PCB waste activities and EPA ID numbers

Certification of Decontamination

Certificate of Disposal and/or recycling. Submit to The Owner before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.

1.6 ENVIRONMENTAL REQUIREMENTS

Use special clothing:

- a. Disposable gloves (polyethylene)
- b. Eye protection
- c. PPE

1.7 SCHEDULING

Notify The Owner 20 days prior to the start of PCB and mercury-containing lamp removal work.

1.8 QUALITY ASSURANCE

1.8.1 PCB and Mercury-Containing Lamp/Caulking Removal Work Plan

Submit a job-specific plan within 20 calendar days after award of contract of the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps. Include in the plan: Requirements for U.C. Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. Obtain approval of the plan by The Owner prior to the start of PCB and/or lamp removal work.

The Contractor shall also coordinate with the General Contractor to evaluate if caulking is to be disturbed by this project. If caulking is to be disturbed by this project, the Abatement Contractor and the General Contractor will be required to coordinate with the Owner and their representative for the testing of any caulking impacted by the project for PCBs. Any abatement of PCB containing caulking materials shall be authorized and approved by the Owner.

1.8.2 PCB and Mercury-Containing Lamp/Caulking Disposal Plan

Submit two copies of a PCB and mercury-containing lamp Disposal Plan within 20 calendar days after award of contract. The PCB and Mercury-Containing Lamp Disposal Plan shall comply with applicable requirements of federal, state, and local PCB and RCRA waste regulations and address:

- a. Estimated quantities of wastes to be generated, disposed of, and recycled.
- b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste/caulking permit applications and EPA identification numbers.
- c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp/caulking wastes.
- d. Spill prevention, containment, and cleanup contingency measures to be implemented.
- e. Work plan and schedule for PCB and mercury-containing lamp/caulking waste removal, containment, storage, transportation, disposal and or recycling. Wastes shall be cleaned up and containerize daily.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the removal of PCB containing lighting ballasts and caulking, associated mercury-containing fluorescent lamps, and high intensity discharge (HID) lamps in accordance with local, state, or federal regulations. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not break mercury containing fluorescent lamps or high intensity discharge lamps.

3.1.1 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:

- a. Obtaining suitable PCB and mercury-containing lamp storage sites.
- b. Notifying The Owner prior to commencing the operation.
- c. Reporting leaks and spills to The Owner.
- d. Cleaning up spills.
- e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding two copies of inspection reports to The Owner.
- f. Maintaining inspection, inventory and spill records.

3.2 PCB SPILL CLEANUP REQUIREMENTS

3.2.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills.

3.2.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

3.2.3 PCB Spill Cleanup

40 CFR 761, subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

3.2.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide two copies of test results of cleanup and certification of decontamination.

3.3 REMOVAL

3.3.1 Ballasts

As ballast is removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label shall be assumed to contain PCBs and containerized and disposed of as required under paragraphs STORAGE FOR DISPOSAL and DISPOSAL. Ballasts with a "No PCB" label may be disposed of as normal construction debris.

3.3.2 Lighting Lamps

Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as hazardous waste as specified herein.

3.4 STORAGE FOR DISPOSAL

3.4.1 Storage Containers for PCBs

49 CFR 178. Store PCB in containers approved by DOT for PCB.

3.4.2 Storage Containers for lamps

Store mercury-containing lamps in appropriate DOT containers. The boxes shall be stored and labeled for transport in accordance with 40 CFR 262, 40 CFR 263, 9 VAC 20-60, and 9 VAC 20-80.

3.4.3 Labeling of Waste Containers

Label with the following:

- a. Date the item was placed in storage and the name of the cognizant activity/building.
- b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.
- c. Label mercury-containing lamp waste in accordance with 49 CFR 172, 40 CFR 262, and 40 CFR 263. Affix labels to all lighting waste containers.

3.5 DISPOSAL

Intact PCB ballasts and mercury containing lamps will be transported and disposed of by the Contractor. Broken or leaking ballasts/lamps will be treated as hazardous waste and disposed of by the Contractor according to all applicable regulations.

3.5.1 Identification Number

Federal regulations 40 CFR 761 and 40 CFR 263 require that generators, transporters, commercial stores, and disposers of PCB and mercury-containing waste possess U.S. EPA identification numbers. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work.

3.5.2 Transporter Certification

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB and lamp waste, sign and date the manifest-acknowledging acceptance of the PCB and mercury-containing waste from The Owner. Return two signed copies to The Owner before leaving the job site. Ensure that the manifest accompanies the PCB and lamp waste at all times. Submit transporter certification of notification to EPA of their PCB and lamp waste activities (EPA Form 7710-53).

3.5.2.1 Certificate of Disposal and/or Recycling

40 CFR 761. Certificate for the PCBs and PCB items, and lamps disposed shall include:

- a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.
- b. The identity of the PCB and lamp waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
- c. A statement certifying the fact of disposal and or recycling of the identified PCB and/or lamp waste, including the date(s) of disposal, and identifying the disposal process used.
- d. A certification as defined in 40 CFR 761.

-- End of Section --

SECTION 02084 Warsaw
REMOVAL OF BUILDING COMPONENTS CONTAINING PCBs AND MERCURY

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.1000	Air Contaminants
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
49 CFR 172	Hazardous Materials, Table, and Hazardous Materials Communications Regulations
49 CFR 178	Shipping Container Specification

VIRGINIA ADMINISTRATIVE CODE (VAC)

9 VAC 20-60	Hazardous Waste Regulations
9 VAC 20-80	Solid Waste Management Regulations

1.2 REQUIREMENTS

Removal and disposal of PCB containing light ballasts and associated mercury-containing lamps. Contractor may encounter leaking PCB light ballasts during renovation.

1.2.1 Scope of Work

The Contractor has the responsibility for determining actual quantities of materials to be removed and reviewing the scope of work. No additional contract price adjustments will be allowed due to variances between actual quantities and the estimated quantities listed herein (unless otherwise specified in this document). The Contractor should allow under their base bid for the removal of all materials as described in the survey report and/or referenced in this specification based on renovation drawings provided to F&R dated November 5, 2009.

The Contractor shall be responsible for removal of the following as part of the base bid:

- A. PCB containing light ballasts (approximately 735)
- B. Mercury containing fluorescent light lamps (approximately 1,450)
- C. Mercury containing wall and mechanical thermostats (approximately 43)
- D. Unit cost (per linear foot) for removal and disposal of PCB caulking

Note: The Abatement Contractor shall coordinate with the Electrical and General Contractors to ensure that all appropriate systems that will be impacted by demolition have been properly decommissioned prior to the start of any work.

1.3 DEFINITIONS

1.3.1 Certified Industrial Hygienist (CIH)

An industrial hygienist who shall be certified by the American Board of Industrial Hygiene.

1.3.2 Leak

Leak or leaking means any instance in which a PCB article, PCB container, or PCB equipment has any PCBs on any portion of its external surface.

1.3.3 Mercury-Containing Lamps

As used in this specification shall mean all fluorescent and high-intensity discharge (HID) lamps scheduled for demolition and/or removal as indicated in the Contract documents that:

- a. Fails the TCLP test for mercury, or
- b. According to the Manufacturer, would fail the TCLP test for mercury
- c. By calculation of equivalent TCLP mercury level from total metal analysis would fail the TCLP test for mercury.

1.3.4 Polychlorinated Biphenyls (PCBs)

PCBs as used in this specification shall mean the same as PCBs, PCB containing lighting ballast, and PCB container, as defined in 40 CFR 761, Section 3, Definitions.

1.3.5 Spill

Spill means both intentional and unintentional spills, leaks, and other uncontrolled discharges when the release results in any quantity of PCBs running off or about to run off the external surface of the equipment or other PCB source, as well as the contamination resulting from those releases.

1.4 QUALITY ASSURANCE

1.4.1 Regulatory Requirements

Perform PCB related work in accordance with 40 CFR 761, 9 VAC 20-60, and 9 VAC 20-80.
Perform mercury-containing lamps storage and transport in accordance with 40 CFR 262, 40 CFR 263, 9 VAC 20-60, and 9 VAC 20-80.

1.4.2 Training

All workers shall have training in accordance with 29 CFR 1910.140 (HAZWOPR). The instruction shall include: The dangers of PCB and mercury exposure, decontamination, safe work practices, and applicable OSHA and EPA regulations. The Owner or their representative shall review and approve the PCB and Mercury-Containing Lamp Removal Work Plans.

1.4.3 Regulation Documents

Maintain at all times one copy each at the office and one copy each in view at the job site of 29 CFR 1910.1000, 40 CFR 761, 40 CFR 262, 40 CFR 263, 9 VAC 20-60, 9 VAC 20-80 and of the Contractor removal work plan and disposal plan for PCB and for associated mercury-containing lamps.

1.5 SUBMITTALS

Submit two copies of the following documentation:

Certificates

Training Certification

PCB and Mercury-Containing Lamp Removal Work Plan

PCB and Mercury-Containing Lamp Disposal Plan

Closeout Submittals

Transporter certification of notification to EPA of their PCB waste activities and EPA ID numbers

Certification of Decontamination

Certificate of Disposal and/or recycling. Submit to The Owner before application for payment within 30 days of the date that the disposal of the PCB and mercury-containing lamp waste identified on the manifest was completed.

1.6 ENVIRONMENTAL REQUIREMENTS

Use special clothing:

- a. Disposable gloves (polyethylene)
- b. Eye protection
- c. PPE

1.7 SCHEDULING

Notify The Owner 20 days prior to the start of PCB and mercury-containing lamp removal work.

1.8 QUALITY ASSURANCE

1.8.1 PCB and Mercury-Containing Lamp/Caulking Removal Work Plan

Submit a job-specific plan within 20 calendar days after award of contract of the work procedures to be used in the removal, packaging, and storage of PCB-containing lighting ballasts and associated mercury-containing lamps. Include in the plan: Requirements for U.C. Personal Protective Equipment (PPE), spill cleanup procedures and equipment, eating, smoking and restroom procedures. Obtain approval of the plan by The Owner prior to the start of PCB and/or lamp removal work.

The Contractor shall also coordinate with the General Contractor to evaluate if caulking is to be disturbed by this project. If caulking is to be disturbed by this project, the Abatement Contractor and the General Contractor will be required to coordinate with the Owner and their representative for the testing of any caulking impacted by the project for PCBs. Any abatement of PCB containing caulking materials shall be authorized and approved by the Owner.

1.8.2 PCB and Mercury-Containing Lamp/Caulking Disposal Plan

Submit two copies of a PCB and mercury-containing lamp Disposal Plan within 20 calendar days after award of contract. The PCB and Mercury-Containing Lamp Disposal Plan shall comply with applicable requirements of federal, state, and local PCB and RCRA waste regulations and address:

- a. Estimated quantities of wastes to be generated, disposed of, and recycled.
- b. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location. Furnish two copies of EPA and state PCB and mercury-containing lamp waste/caulking permit applications and EPA identification numbers.
- c. Names and qualifications (experience and training) of personnel who will be working on-site with PCB and mercury-containing lamp/caulking wastes.
- d. Spill prevention, containment, and cleanup contingency measures to be implemented.
- e. Work plan and schedule for PCB and mercury-containing lamp/caulking waste removal, containment, storage, transportation, disposal and or recycling. Wastes shall be cleaned up and containerize daily.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 WORK PROCEDURE

Furnish labor, materials, services, and equipment necessary for the removal of PCB containing lighting ballasts and caulking, associated mercury-containing fluorescent lamps, and high intensity discharge (HID) lamps in accordance with local, state, or federal regulations. Do not expose PCBs to open flames or other high temperature sources since toxic decomposition by-products may be produced. Do not break mercury containing fluorescent lamps or high intensity discharge lamps.

3.1.1 Work Operations

Ensure that work operations or processes involving PCB or PCB-contaminated materials are conducted in accordance with 40 CFR 761, 40 CFR 262 40 CFR 263, and the applicable requirements of this section, including but not limited to:

- a. Obtaining suitable PCB and mercury-containing lamp storage sites.
- b. Notifying The Owner prior to commencing the operation.
- c. Reporting leaks and spills to The Owner.
- d. Cleaning up spills.
- e. Inspecting PCB and PCB-contaminated items and waste containers for leaks and forwarding two copies of inspection reports to The Owner.
- f. Maintaining inspection, inventory and spill records.

3.2 PCB SPILL CLEANUP REQUIREMENTS

3.2.1 PCB Spills

Immediately report to the Contracting Officer any PCB spills.

3.2.2 PCB Spill Control Area

Rope off an area around the edges of a PCB leak or spill and post a "PCB Spill Authorized Personnel Only" caution sign. Immediately transfer leaking items to a drip pan or other container.

3.2.3 PCB Spill Cleanup

40 CFR 761, subpart G. Initiate cleanup of spills as soon as possible, but no later than 24 hours of its discovery. Mop up the liquid with rags or other conventional absorbent. The spent absorbent shall be properly contained and disposed of as solid PCB waste.

3.2.4 Records and Certification

Document the cleanup with records of decontamination in accordance with 40 CFR 761, Section 125, Requirements for PCB Spill Cleanup. Provide two copies of test results of cleanup and certification of decontamination.

3.3 REMOVAL

3.3.1 Ballasts

As ballast is removed from the lighting fixture, inspect label on ballast. Ballasts without a "No PCB" label shall be assumed to contain PCBs and containerized and disposed of as required under paragraphs STORAGE FOR DISPOSAL and DISPOSAL. Ballasts with a "No PCB" label may be disposed of as normal construction debris.

3.3.2 Lighting Lamps

Remove lighting tubes/lamps from the lighting fixture and carefully place (unbroken) into appropriate containers (original transport boxes or equivalent). In the event of a lighting tube/lamp breaking, sweep and place waste in double plastic taped bags and dispose of as hazardous waste as specified herein.

3.4 STORAGE FOR DISPOSAL

3.4.1 Storage Containers for PCBs

49 CFR 178. Store PCB in containers approved by DOT for PCB.

3.4.2 Storage Containers for lamps

Store mercury-containing lamps in appropriate DOT containers. The boxes shall be stored and labeled for transport in accordance with 40 CFR 262, 40 CFR 263, 9 VAC 20-60, and 9 VAC 20-80.

3.4.3 Labeling of Waste Containers

Label with the following:

- a. Date the item was placed in storage and the name of the cognizant activity/building.
- b. "Caution Contains PCB," conforming to 40 CFR 761, CFR Subpart C. Affix labels to PCB waste containers.
- c. Label mercury-containing lamp waste in accordance with 49 CFR 172, 40 CFR 262, and 40 CFR 263. Affix labels to all lighting waste containers.

3.5 DISPOSAL

Intact PCB ballasts and mercury containing lamps will be transported and disposed of by the Contractor. Broken or leaking ballasts/lamps will be treated as hazardous waste and disposed of by the Contractor according to all applicable regulations.

3.5.1 Identification Number

Federal regulations 40 CFR 761 and 40 CFR 263 require that generators, transporters, commercial stores, and disposers of PCB and mercury-containing waste possess U.S. EPA identification numbers. The contractor shall verify that the activity has a U.S. EPA generator identification number for use on the Uniform Hazardous Waste manifest. If not, the contractor shall advise the activity that it must file and obtain an I.D. number with EPA prior to commencement of removal work.

3.5.2 Transporter Certification

Comply with disposal and transportation requirements outlined in 40 CFR 761 and 40 CFR 263. Before transporting the PCB and lamp waste, sign and date the manifest-acknowledging acceptance of the PCB and mercury-containing waste from The Owner. Return two signed copies to The Owner before leaving the job site. Ensure that the manifest accompanies the PCB and lamp waste at all times. Submit transporter certification of notification to EPA of their PCB and lamp waste activities (EPA Form 7710-53).

3.5.2.1 Certificate of Disposal and/or Recycling

40 CFR 761. Certificate for the PCBs and PCB items, and lamps disposed shall include:

- a. The identity of the disposal and or recycling facility, by name, address, and EPA identification number.
- b. The identity of the PCB and lamp waste affected by the Certificate of Disposal including reference to the manifest number for the shipment.
- c. A statement certifying the fact of disposal and or recycling of the identified PCB and/or lamp waste, including the date(s) of disposal, and identifying the disposal process used.
- d. A certification as defined in 40 CFR 761.

-- End of Section --

**SECTION 02510
WATER DISTRIBUTION SYSTEM**

PART 1 - GENERAL

- 1.1 All piping, valves, fittings, fire hydrants, meters, meter vaults, appurtenances and other products shall conform to the requirements of NFPA 13-2007 and NFPA 22-2003, where applicable.
- 1.2 Quality Assurance
 - A. Comply with all applicable codes and regulations as required by regulatory agencies having jurisdictions over this Work.
- 1.3 Connections to existing system:
 - A. The Contractor shall make connections to the existing system under a pressure condition, complying with the system owner's requirements for the time of day such work can be done.
- 1.4 Contractor shall submit for approval dimensioned layout drawings for all flanged ductile iron pipe. Drawings shall include all fittings, valves, equipment, taps, appurtenances, and dimensions to locate pipe in buildings.
- 1.5 Exposed pipe shall be installed level, plumb and square to building walls and equipment in accordance with industry standards and practices.

PART 2 - PRODUCTS

- 2.1 All pipe, fittings, restraint devices, valves, etc. for piping systems shall be listed for fire service use (except where expressly prohibited by the water authority).
- 2.2 Underground Pipe and fittings
 - A. Ductile Iron Pipe:
 - 1. Ductile iron pipe shall meet the requirements of AWWA C151, AWWA C150 and Rubber-gasket joints shall meet the requirements of AWWA C111. 3" through 24" pipe shall be, at a minimum, class 52 with a working pressure of 350 psi. Pipe shall have a single cement-mortar lining and a bituminous seal coat conforming to the requirement of AWWA C104. A minimum of 5% of the pipe furnished shall be gauged for roundness full length and so marked. Pressure class of pipe shall be increased if the specific installation warrants it.
 - B. Fittings
 - 1. Ductile Iron Fittings
 - a) Fittings shall be ductile iron and shall be in accordance with AWWA C110 or C153. Pressure ratings shall be a minimum of 350 psi for fittings 24-inch and smaller and 250 psi for 30-inch. All fittings shall have a single cement mortar lining on the interior and a bituminous seal coating on the exterior. Fittings shall have mechanical joints conforming to the requirements of AWWA C111. Bolts for mechanical joint fittings shall be high strength, corrosion – resistant low alloy steel with hexagon nuts having a minimum yield point of 45,000 psi in accordance with AWWA C111. Mechanical joint bolts shall be torqued with a torque wrench as per manufacturer's recommendations.
 - C. Thrust Restraint
 - 1. All pipe fittings, plugs, caps, tees, and bends in underground ductile iron or PVC piping must be restrained utilizing Megalug Series 1100 retainer glands by EBAA Iron Sales, Inc. (or approved equal). Glands shall be manufactured of ductile iron

**SECTION 02510
WATER DISTRIBUTION SYSTEM**

conforming to ASTM A 536-80. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and C153/A21.53. Twist-off nuts shall be used to insure proper actuating of the restraining devices. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2.

D. Buried Copper Tubing

1. Copper tubing for underground services shall be seamless, annealed copper tubing Type K, in conformance with ASTM B88. Fittings shall be case bronze with flared joints.

E. Couplings for underground or buried service shall be ductile iron mechanical joint in accordance with underground ductile fittings in this section.

2.3 Above Ground or Exposed Piping

A. Ductile Iron Pipe

1. Ductile iron pipe installed above ground, inside buildings or underground vaults, shall be flanged ductile iron pipe class 53 in accordance with ANSI A21.15 (AWWA C115). Unless indicated otherwise on the drawings pipe shall have Class 125 flanged joints utilizing factory installed screwed flanges (no uniflange type flanges are permitted) meeting the requirements of ANSI B 16.1, outside coating shall be red primer, and gaskets for flanged pipe shall be 1/8" thick full face red rubber. All steel flanges mating to flat face flanges shall have the raised face machined off. Pipe shall have a single cement mortar lining with asphaltic seal coat meeting the requirements for AWWA C104.

B. Ductile Iron Fittings

1. Fittings for ductile iron pipe shall be flanged ductile iron in accordance with ANSI A21.10 (AWWA C110). Ductile iron compact fittings, in accordance with ANSI A21.53 (AWWA C153), may not be used unless specifically approved by the Engineer. Fittings up to 30" diameter shall have a minimum working pressure rating of 250 psi. Unless indicated otherwise on the drawings, pipe shall have Class 125 flanged joints meeting the requirements of ANSI B 16.1, outside coating shall be red primer, and gaskets for flanged pipe shall be 1/8" thick full face red rubber. Fittings shall have a single cement-mortar lining and a bituminous seal coat conforming to the requirement of AWWA C104.

C. Above Ground Copper Tubing

1. Copper tubing for exposed services shall be seamless, hard copper tubing Type L, in conformance with ASTM B88. Fittings shall be wrought copper with soldered joints. Solder shall be 95-5 approved for potable water service.

D. Couplings

1. Couplings for above ground or exposed service shall be Dresser Style 38 or approved equal. Transition couplings shall be Dresser Style 162 or approved equal. All couplings shall be rodded unless otherwise noted.

E. Flange adaptors

1. Flange adaptors shall be used where indicated on the drawings or as approved by the engineer. Flange adaptors may be used as a final connection or to allow for disassembly of pipe for equipment maintenance in approved locations. Flange adaptors are not to be used to make up for misaligned pipe.

**SECTION 02510
WATER DISTRIBUTION SYSTEM**

2. Flanged Adapter shall be JCM flanged coupling adaptors model 301R or approved equal.

2.4 Gate Valves

- A. Gate valves 3" through 12" shall open counter-clockwise, have a resilient seat and meet the requirements of AWWA C509. Body shall be of cast iron with a 250 psig maximum working pressure and hydrostatically tested to 500 psig. Wedge shall be constructed of cast iron, bonded in synthetic rubber in accordance with ASTM D2000. Valve shall be coated inside and out with a fusion epoxy coating of a nominal 10 mil thickness on all exposed iron surfaces in compliance with AWWA C550 and is NSF 61 certified. Valves shall be bi-directional flow and have a ten year limited warranty.
 1. Above ground valves or exposed valves in vaults shall utilize outside screw and yoke (OS&Y) with rising stems and have flanged ends meeting the requirements of ANSI B 16.1, Class 125.
 2. Underground valves shall utilize non rising stems, mechanical joint ends with a 2" operating nut in accordance with AWWA C111.
 3. Gate valves 3" and larger when located 6ft. or more above the finish floor or operating platform shall have chain operators.
 4. Valves shall be Mueller series 2360, or approved equal.
- B. Buried gate valves 2" in size shall utilize a non-rising stem, open counter-clockwise, resilient seat and meet the requirements of AWWA C509. Valve shall be equipped with a 2-inch square AWWA operating unit. Valve ends shall be NPT connections. Valves shall be Mueller series A-2360, or approved equal.

2.5 Ball Valves - Above Ground

- A. Ball valves 2" and smaller shall be 150 lb rated, threaded ends, bronze or stainless steel body (stainless steel valves are to be used on stainless steel pipe), full port, lever operated, ball valves, with stainless steel ball and stem, and Teflon seats. Ball valves shall be Crane figure 9201 (bronze body), 9231(stainless steel) or approved equal.

2.6 Valve Boxes

- A. Valve boxes for buried valves shall be cast iron, screw adjustable shaft boxes, with a minimum shaft diameter of 5-1/4 inches, unless otherwise specified on the Drawings. Valve box covers shall be marked with the word "WATER". Valves with valve boxes shall have an extended shaft pinned to the 2" operating nut and terminate 12" below finish grade. Valve box shall have a 24" x 24" x 4" concrete collar around top of valve box as per drawing detail.

2.7 Tamper Switches

- A. All valves shall have tamper switches in accordance with NFPA 22 and 72. The signals for these switches shall be connected to the fire pump control panel located in the main building.

2.8 Pressure Gages

- A. Pressure gauges shall be of all stainless steel construction, 3.5 inch case size, accuracy of 1% over the entire dial arch, 1/4" NPT bottom connection, Pressure range shall be as indicated on the drawings.
- B. Pressure gages shall be Ashcroft stainless steel-case 1009 pressure gauges or approved equal.

**SECTION 02510
WATER DISTRIBUTION SYSTEM**

- C. All pressure gages shall be installed with a ¼" stainless steel ball valve and stainless steel nipples.
- D. All pressure gages shall be mounted with fittings or on fitting bosses. NO TAPPING OF PIPE OR SADDLES WILL BE ALLOWED.

2.9 Pipe Supports

- A. Pipes shall be supported by steel pipe hangers, clamps. Brackets, rods and inserts as required to support the imposed pipe loads. Hangers in general shall be new, manufactured of carbon steel and hot dipped galvanized after fabrication or 304 stainless steel.
- B. Pipes 2 ½ inches and larger shall be supported with adjustable floorstand type pipe supports as detailed on the drawings. Pipe supports shall be Standon Model S89 flange support, Standon Model S96 cradle support as manufactured by Material Resources, Inc. or approved equal.
- C. Pipes 2" and smaller shall be supported from the floor, walls or ceiling depending on the type of building construction. Pipe supports for these size pipes shall be as manufactured by Unistrut Building Systems. Supports shall consist of floor stands, wall brackets or clevis type hangers. Unistrut and appurtenances shall be stainless steel. Clips for copper tubing's shall be copper coated. Minimum threaded rod size shall be 3/8 inch.
- D. Ductile Iron and steel pipe supports shall be spaced in accordance with the following schedule:

Pipe sizes (inches)	½ - 3/4	1 - 1 1/4	1 ½ - 2	3 - 4	6	8
Max spacing (feet)	4	6	8	10	12	14

- E. Copper tubing pipe supports shall be spaced in accordance with the following schedule:

Nominal tubing size (inches)	½ - 3/4	1 - 1 1/4	1 ½ - 2
Max spacing (feet)	4	6	8

- F. Pipe supports shall be located as per the following:
 - 1. Maximum spacing as indicated above
 - 2. Maximum of 12 inches from all horizontal and vertical changes in direction.
 - 3. On the suction and discharge of pump piping to eliminate pipe stresses on the pump flanges.
 - 4. On the connections to all equipment to eliminate pipe stresses on the equipment connections and allow equipment removal.
 - 5. On the inlet and outlet piping to the water meter to allow the removal of the water meter.
 - 6. Additional pipe supports as indicated on the drawings.

**SECTION 02510
WATER DISTRIBUTION SYSTEM**

PART 3 - EXECUTION

3.1 General

- A. Water lines shall be laid to lines and grades shown on the drawings with appurtenances and service connections at required locations. Installation of all materials shall be in strict conformance with manufacturer's recommendations, AWWA standards, NFPA 13-2007 and NFPA 22-2003 requirements.

3.2 Separation of Water Lines and Sanitary and/or Combined Sewer

- A. Follow State Health Department standards for separation of water mains and sewer lines.

B. Parallel Installation:

- 1. Normal Conditions Water lines shall be constructed at least 10 feet horizontally from a sewer or sewer manhole whenever possible. The distance shall be measured edge to edge.
- 2. Unusual Conditions When local conditions prevent a horizontal separation of at least 10 feet, the water line may be laid closer to a sewer or sewer manhole provided that:
 - a) The bottom of the water line is at least 18 inches above the top of the sewer.
 - b) Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA approved water pipe pressure tested in place to 50 psi without leakage prior to backfilling. The sewer manhole shall be of watertight construction and tested in place.

C. Crossing:

- 1. Normal Conditions: Water lines crossing over sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water line and the top of the sewer whenever possible.
- 2. Unusual Conditions: When local conditions prevent the vertical separation described in crossing, normal conditions, (paragraph above) the following construction shall be used.
 - a) Sewers passing over or under water lines shall be constructed of the materials described in parallel installation, unusual conditions Paragraph b. above.
 - b) Water lines passing under sewers shall, in addition, be protected by providing:
 - i. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water lines.
 - ii. That the length of the water line shall be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer.

- D. Sanitary and/or combined sewers or sewer manholes No water pipes shall pass through or come in contact with any part of sewer or sewer manhole.

3.3 Examination of Material:

- A. All pipes, fittings, valves and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be

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WATER DISTRIBUTION SYSTEM**

marked and held for inspection by the Owner, who may prescribe corrective repairs or reject materials.

3.4 Pipe Ends:

- A. All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt sand, grit, or any other foreign material before the joint is made. Proper lubricant shall be used for all push joint pipe.

3.5 Pipe Cleanliness:

- A. Foreign material shall be prevented from entering the pipe while it is being placed in the trench. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

3.6 Pipe Placement:

- A. Laying of the pipe shall be commenced immediately after the excavation is started, and every means must be used to keep pipe lying closely behind the trenching as each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade before the next length of pipe is laid. No more than 200 lf of trench shall be opened at any one time. No opened trenches will be allowed at the end of the work day.
- B. Lay pipe with bell ends facing the direction of laying. Where grade is 10 percent or greater, lay pipe uphill with bell ends upgrade.

3.7 Pipe Plugs:

- A. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a water tight plug or other means approved by the Engineer. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation should the trench fill with water.

3.8 Laying Conditions

- A. Pipe shall be placed in a dry trench at the proper line and grade.

3.9 Pipe Deflection

- A. Permissible deflection in mechanical joint pipe shall not be greater than 1/2 of that listed in AWWA C600 or as recommended by pipe manufacturer. No joint deflection shall be allowed in PVC pipe. Radius turn with PVC pipe shall be by bending pipe at 1/2 manufacturers recommended deflection.

3.10 Pipe Cutting:

- A. Cutting of the pipe shall be done in a neat, workmanlike manner with the proper tools without creating damage to the pipe or cement mortar lining.

3.11 Restrained Joints

- A. Provide reaction anchors of concrete blocking, metal harness, retainer gland type, restraining gaskets or restrained joint type pipe at all changes in direction of pressure pipelines and as shown on Drawings.
- B. All mechanical joint bolts shall be torqued with a torque wrench as recommended by the manufacturer.

Bolt Size – Inches

Torque Ft. - Lbs.

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5/8	45 - 60
3/4	75 - 90
1	100-120

- C. Tighten nuts on alternate side of the gland until pressure on the gland is equally distributed

3.12 Manholes (at air release, valves, etc., as called for in the Drawings):

- A. Manholes shall be constructed to the elevations shown on the Contract Drawings in accordance with the provisions of the Standard Details.
- B. Set manhole base section on bed of VDOT #57 stone to a minimum depth of 8 in. Stone shall be thoroughly compacted and carefully leveled.
- C. Join all manhole riser and cone or flat slab top sections by the use of o-ring type round rubber gaskets.
- D. Install flexible manhole connections for all pipes sizes 4 in. to 24 in., inclusive and apply sealant to completely fill joint between manhole barrel and flexible connection for the full thickness of the manhole barrel.
- E. Plug lift holes and repair any defects in manhole.
- F. Set adjusting rings in Portland cement mortar bed.
 - 1. Rings will not be required outside of paved roadways or walkways unless called for on the Contract Drawings.
 - 2. Rings in paved roadways or walkways shall permit upward or downward adjustment of manhole frame by six inches.
- G. All manhole frames shall be set on a bed of butyl mastic and bolted down with a minimum of 4 -5/8" stainless steel anchor bolts. Anchor bolts shall be embedded a minimum of 4" into concrete.

3.13 Road/Highway Crossings

- A. Where crossing is to be installed beneath a Commonwealth of Virginia road or highway, all operations and materials shall conform to the requirements of the Virginia Department of Transportation governing such crossings, and the contractor shall obtain approval of all materials and methods to be employed before such work is started. A copy of such permission shall be filed with the Owner prior to starting the work. The contractor will also be required to furnish a release from the proper authorities before final acceptance of the work by the Owner. The contractor shall secure from the Department of Transportation the necessary information regarding proper bracing, sheeting, shoring and other required protection of the highway and traffic during the construction operation.
- B. Where an open cut is permissible in crossing the State Highway instead of boring, the contractor shall make the necessary provisions for handling traffic and replacing the roadbed and surface as required by the Virginia Department of Transportation.

3.14 Setting Valves and Valve Boxes.

- A. Install valves with operator stems plumb in the vertical plane. Locate valves where shown on Drawings.
- B. Equip all underground valves with valve boxes or standard precast concrete manholes where shown on the Drawings. Set valve boxes or manholes in accordance with

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drawings. Set box plumb in the vertical direction in alignment with valve stem centered on valve nut. Where valve boxes or manhole covers are used, set the valve box to prevent transmitting shock or stress to the valve. Set the box cover flush with the finished ground surface or pavement. PVC extensions shall not be permitted.

3.15 Flushing

1. All mains shall be flushed in accordance with NFPA 13-2007 and NFPA 22-2003 requirements.

3.16 Testing

A. Pressure Testing of Water Mains and Pressure Pipe

1. Hydrostatic and leakage testing shall be performed in accordance with NFPA 13-2007 and NFPA 22-2003 requirements, including (but not limited to) the minimum 200 psi test pressure.

END OF SECTION 02510

**SECTION 02511
ALTITUDE AND FLOW CONTROL VALVES**

PART 1 - GENERAL

- 1.1 For each type of valve, valves and associated equipment supplied shall be provided by a single manufacturer, who assumes unit responsibility for the items supplied. The manufacturers specified represent the standard of quality required, and valves which fully conform to the technical requirements of this Section. Substitutions shall be of reputable manufacturers capable of documenting a record of successful installations of similar equipment of at least 10 years and shall be subject to approval by engineer.
- 1.2 Valves and all appurtenances shall be in accordance with the latest NFPA regulations, where applicable.
- 1.3 For all items supplied under this Section, submit:
 - A. Detailed product data and descriptive literature including dimensions, weights, headloss and capacity data, pressure rating and materials of construction.
 - B. Shop drawings which clearly illustrate the general arrangement of the equipment and cross-sectional and cutaway views of the components.
- 1.4 For equipment of manufacturers not specified herein, in addition to manufacturer's catalog data sheets, submit:
 - A. Installation list complete with contact names and phone numbers of not less than 5 installations of the exact size and model of equipment to be supplied under this Contract, each of which has been in service in a similar application for not less than 5 years.

PART 2 - PRODUCTS

- 2.1 Altitude and Flow Control Valve
 - A. The altitude control valve will be installed on the tank inlet line and open when the tank level drops to replenish the tank. The valve will sense the tank head from a sensing line run back to the pilot mounted on the main valve. When the valve opens it will limit the flow into the tank to 75 gpm. There will be a differential pilot control that senses pressure across a downstream orifice plate. It will modulate the main valve to limit the flow.
 - B. The main valve will be reduced ported, diaphragm actuated and consist of three major components. The body, with seat installed, the diaphragm assembly and the cover with cover bearing. The main valve will be ductile iron and have bronze trim. The diaphragm assembly shall be fully guided throughout its entire stroke. The main valve will have a fusion bonded epoxy coating on all ferrous metal surfaces. It will be a packless valve with no o-rings or packing glands anywhere within the main valve. The main valve will have a one piece stainless steel seat. No snap seat rings will be accepted.
 - C. The pilot control system will have two separate pilots. One for opening and shutting off at tank high water level and the other for throttling/limiting the flow. The pilot system will also have opening and closing speed controls. The valve system will have an orifice plate installed downstream which shall have a bore properly sized to limit flow as specified.
 - D. The manufacturer shall warranty the valve for 3 years from date of shipment. The manufacturer shall also provide a direct factory employee for start up, training and adjustment.
 - E. The valve shall be a 3" 610-21BCSYKC D.B. X105LCW as manufactured by Cla-Val Co. Newport Beach, Ca.

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ALTITUDE AND FLOW CONTROL VALVES

PART 3 - EXECUTION

- 3.1 Install valves in accordance with manufacturer's written instructions and approved submittals.
- 3.2 Manufacturer's authorized representative shall be present at the job site for assistance during equipment start-up and to train owner personnel in the operation, maintenance and troubleshooting of all equipment provided.

END OF SECTION 02511

SECTION 02751

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete sidewalks and stair steps.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - Cast-in-Place Concrete.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 1999.
- C. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 1988 (Reapproved 2002).
- D. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2005.
- E. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2007.
- F. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2008a.
- G. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2007.
- H. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2008).

PART 2 PRODUCTS

2.01 FORM MATERIALS

- A. Wood form material, profiled to suit conditions.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D 1751).
 - 1. Thickness: 1/2 inch.

2.02 REINFORCEMENT

- A. Reinforcing Steel and Welded Wire Reinforcement: Types specified in Section 03300.

2.03 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03300.

2.04 ACCESSORIES

- A. Curing Compound: ASTM C 309, Type 1, Class A.

2.05 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Properties:

1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: 3500 psi.
2. Total Air Content: 4 percent, determined in accordance with ASTM C 173/C 173M.
3. Maximum Slump: 3 inches.

2.06 MIXING

- A. Transit Mixers: Comply with ASTM C 94/C 94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

- A. Prepare subbase in accordance with State of Virginia Highways standards.

3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.

3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

- A. Place reinforcement at bottom of slabs-on-grade.

3.06 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

- A. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- B. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

3.08 JOINTS

- A. Place 3/8 inch wide expansion joints at 20 foot intervals and to separate paving from vertical surfaces and other components.
 1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
 2. Secure to resist movement by wet concrete.
- B. Provide sawn joints:
 1. At 3 feet intervals.

- C. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.09 FINISHING

- A. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.
- B. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.10 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION

**SECTION 03300
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Slabs-on-grade.
- B. Related Sections include the following:
 - 1. Division 02 Section "Earthwork" for drainage fill under slabs-on-grade.
 - 2. Division 02 Section "Cement Concrete Pavement" for concrete pavement and walks.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Curing compounds.
 - 5. Vapor retarders.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5. Sections 1 through 5 and Section 7, "Lightweight Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and bond break strips, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, concrete protection, and test sample storage and curing.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82, as drawn.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.02 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete.

2.03 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II.
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M.

2.04 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.05 VAPOR RETARDERS AND VAPOR BARRIERS

- A. Vapor Retarder: A 10 mil vapor retarder with a permeability of 0.04 perms or lower when tested in accordance with ASTM E 96; meeting or exceeding the requirement of ASTM E 1745 Class A; and wherein the vapor retarder component (plastic) is no less than 10 mils thick in accordance with ACI 302.1 R-96, and consists of multi-layer extruded virgin polyolefin plastic. Ungraded polyethylene sheet is not acceptable. Include companion joint tape, mastic, and accessory materials.
 - 1. Available products include:
 - a. Stego Wrap "10A" (10 mil) by Stego Industries LLC.
 - b. Griffolyn 10 Mil Green by Reef Industries.
 - c. Perminator 10 by W.R. Meadows

2.06 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.07 RELATED MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.08 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.09 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25 percent.

2. Ground Granulated Blast-Furnace Slag: 50 percent.
 3. Combination of Portland cement substitutes is not permitted.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use high-range water-reducing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Do not use admixtures containing calcium chloride or chloride ions in excess of 0.1 percent.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. All normal weight concrete except slabs-on-grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: As indicated at 28 days.
 2. Slump Limit: 5 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 3. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: As indicated at 28 days.
 2. Slump Limit: 5 inches, 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 3. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISI's "Code of Standard Practice for Steel Buildings and Bridges."

3.02 VAPOR RETARDERS AND VAPOR BARRIERS

- A. Plastic Vapor Retarders and Vapor Barriers: Place, protect and repair vapor retarders and barriers according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches and seal with manufacturer's recommended tape and mastic.

3.03 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps. Lace overlaps with wire.

3.04 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- C. Isolation Joints in Slabs-on-Grade: Install bond-break strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend bond-break strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - 2. Terminate full-width bond-break strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 - 3. Install bond-break strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.05 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Notify the Owner's Inspection Service to permit inspection of sub-base a minimum of 24 hours prior to placement of reinforcing steel and concrete. The Inspection Service shall inspect and approve all foundation subgrades prior to placing concrete.
- C. Notify the Owner's Inspection Service to permit inspection of reinforcing steel a minimum of 24 hours prior to concrete placement. Notify Inspection Service 24 hours prior to any scheduled concrete pour.

- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- H. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.06 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
 - 1. Apply scratch finish to surfaces indicated to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unlevleed, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.07 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..
3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.08 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
 - 1.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 2. After concrete has cured at least 14 days, correct high areas by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean,

square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.09 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Testing Agency shall provide certification of field and laboratory technicians for qualifications required in ACI 318-08, Section 5.6.1 and paragraph 1.5.B.1 and .2 of this specification.
- B. Inspections:
 1. Steel reinforcement placement.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172, as modified in these specifications, shall be performed according to the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 5. Unit Weight: Fresh unit weight of structural concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Compression Test Specimens: ACI 318-08 and ASTM C-31-06. Samples shall be taken from concrete pump discharge hose when concrete is transported by concrete pump.
 - a. Cast and laboratory cure two sets of two 6 x 12 cylinder specimens or two sets of three 4 x 8 cylinder specimens for each composite sample. Test specimen size shall be agreed upon by A/E and testing agency before construction.
 7. Compressive-Strength Tests: ASTM C 39-05.

- a. 6 x 12 Specimens: Test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. 4 x 8 Specimens: Test one set of three laboratory-cured specimens at 7 days and one set of three specimens at 28 days.
 - c. A compressive-strength test shall be the average compressive strength from a set of specimens obtained from same composite sample and tested at age indicated.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect. Contractor shall pay for additional tests.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION

SECTION 04810

UNIT MASONRY ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete Block.
- B. Clay Facing Brick.
- C. Mortar and Grout.
- D. Reinforcement and Anchorage.
- E. Flashings.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03200 - Concrete Reinforcement: Reinforcing steel for grouted masonry.
- B. Section 05500 - Metal Fabrications: Loose steel lintels.
- C. Section 06100 - Rough Carpentry: Nailing strips built into masonry.
- D. Section 07840 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- E. Section 07900 - Joint Sealers: Backing rod and sealant at control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2005.
- B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2005.
- C. ASTM A 82/A 82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.
- E. ASTM A 641/A 641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009.
- F. ASTM C 90 - Standard Specification for Loadbearing Concrete Masonry Units; 2006b.
- G. ASTM C 91 - Standard Specification for Masonry Cement; 2005.
- H. ASTM C 129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2006.
- I. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar; 2004.
- J. ASTM C 150 - Standard Specification for Portland Cement; 2007.
- K. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006.
- L. ASTM C 216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2007a.
- M. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; 2007a.

- N. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout; 2007.
- O. ASTM C 476 - Standard Specification for Grout for Masonry; 2008.
- P. ASTM D 4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2004.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.

1.05 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
 - 2. Special Shapes: Provide non-standard blocks configured for corners and lintels.
 - 3. Load-Bearing Units: ASTM C 90, normal weight.
 - a. Hollow block.
 - b. Exposed faces: Manufacturer's standard color and texture.
 - 4. Non-Loadbearing Units: ASTM C 129.
 - a. Hollow block.
 - b. Normal weight.

2.02 BRICK UNITS

- A. Facing Brick: ASTM C 216, Type FBS, Grade SW.
 - 1. Color and texture: Match existing face brick.
 - 2. Reuse of brick: When possible reuse brick from selectively demolished portions of exterior wall indicated on drawings.
 - 3. Nominal size: As indicated on drawings.

2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C 91, Type N.
 - 1. Colored mortar: Premixed cement as required to match existing mortar. Colored mortar is only used at face brick. Manufacturer's standard grey at all other locations.
- B. Portland Cement: ASTM C 150, Type I; color as required to produce approved color sample.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Mortar Aggregate: ASTM C 144.
- E. Grout Aggregate: ASTM C 404.

- F. Water: Clean and potable.
- G. Accelerating Admixture: Nonchloride type for use in cold weather.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers of Joint Reinforcement and Anchors:
 - 1. Dur-O-Wal: www.dur-o-wal.com.
 - 2. Hohmann & Barnard, Inc: www.h-b.com.
 - 3. Masonry Reinforcing Corporation of America: www.wirebond.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.
- B. Reinforcing Steel: Type specified in Section 03300; size as indicated on drawings; galvanized finish.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: Truss type; ASTM A 82/A 82M steel wire, mill galvanized to ASTM A 641/A 641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
- E. Multiple Wythe Joint Reinforcement: Truss type; fabricated with moisture drip; ASTM A 82/A 82M steel wire, hot dip galvanized after fabrication to ASTM A 153/153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

2.05 FLASHINGS

- A. EPDM Flashing: ASTM D 4637, Type II, 0.040 inch thick.
- B. Lap Sealant: Butyl type as specified in Section 07900.

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
- C. Nailing Strips: Softwood lumber, preservative treated; as specified in Section 06100.
- D. Weeps: Molded PVC grilles, insect resistant.
 - 1. Manufacturers:
 - a. Dur-O-Wal: www.dur-o-wal.com.
 - b. Hohmann & Barnard, Inc: www.h-b.com.
 - c. Masonry Reinforcing Corporation of America: www.wirebond.com.
 - d. Substitutions: See Section 01600 - Product Requirements.
- E. Cavity Vents: Molded PVC grilles, insect resistant.
 - 1. Manufacturers:
 - a. Dur-O-Wal: www.dur-o-wal.com.
 - b. Hohmann & Barnard, Inc: www.h-b.com.
 - c. Masonry Reinforcing Corporation of America: www.wirebond.com.
 - d. Substitutions: See Section 01600 - Product Requirements.
- F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C 270, using the Proportion Specification.
 - 1. Masonry below grade and in contact with earth: Type S.
 - 2. Exterior, loadbearing masonry: Type S.
 - 3. Exterior, non-loadbearing masonry: Type N.
 - 4. Interior, loadbearing masonry: Type S.
 - 5. Interior, non-loadbearing masonry: Type O.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match existing mortar, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Grout: ASTM C 476. Consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COLD AND HOT WEATHER REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
- D. Brick Units:
 - 1. Bond: Running.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Interlock intersections and external corners.

- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Cut mortar joints flush where wall tile is scheduled.
- H. Isolate masonry partitions from vertical structural framing members with a control joint.

3.05 WEEPS/CAVITY VENTS

- A. Install weeps in cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Install cavity vents in cavity walls at 32 inches on center horizontally below shelf angles and lintels, and near top of walls.

3.06 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.07 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Lap joint reinforcement ends minimum 6 inches.

3.08 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHER MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Lap joint reinforcement ends minimum 6 inches.

3.09 REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Lap joint reinforcement ends minimum 6 inches.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
 - 2. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Extend plastic and EPDM flashings to within 1/4 inch of exterior face of masonry.

3.11 LINTELS

- A. Install loose steel lintels over openings as indicated.
- B. Maintain minimum 8 inch bearing on each side of opening.

3.12 GROUTED COMPONENTS

- A. Lap splices minimum 24 bar diameters.

- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.

3.13 CONTROL AND EXPANSION JOINTS

- A. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- B. Size control joint in accordance with Section 07900 for sealant performance.

3.14 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, wood nailing strips, and anchor bolts and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

3.16 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.

3.17 SCHEDULES

- A. Exterior Wall: Composite masonry with an exterior wythe of brick veneer, bonded with wire ladder reinforcement to inner wythe of interior facing split faced concrete block masonry (CMU) with 2 inch (50 mm) air space.
- B. Interior Partitions: Single wythe concrete block units.

END OF SECTION

SECTION 05120

STRUCTURAL STEEL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Structural steel.
 - 2. Architecturally exposed structural steel.
 - 3. Grout.
- B. Related Sections include the following:
 - 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
 - 2. Division 05 Section "Metal Fabrications" for steel lintels or shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other metal items not defined as structural steel.
 - 3. Division 09 painting Sections and Division 09 Section "High-Performance Coatings" for surface preparation and priming requirements.

1.03 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.
- B. Architecturally Exposed Structural Steel: Structural steel designated as architecturally exposed structural steel in the Contract Documents.

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- C. Welding certificates.
- D. Qualification Data: For fabricator.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category Sbd or the fabricator shall employ an approved independent inspection or quality control agency to conduct periodic, in-plant inspections at the fabricator's plant, at a frequency that will assure

the fabricator's conformance to the requirements of the inspection agency's approved quality control program as required by the VUSBC (Virginia Uniform Statewide Building Code) 2006 Edition, effective May 1, 2008.

- B. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- C. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. AISC's "Specification for Structural Steel Buildings"
 - 3. AISC's "Specification for the Design of Steel Hollow Structural Sections."
 - 4. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
 - 5. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
 - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.07 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles and S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain.
- B. Headed Anchor Rods: ASTM F 1554, Grade 36, Grade 55 (weldable) and Grade 105 as indicated.

1. Nuts: ASTM A 563 heavy hex carbon steel.
 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 3. Washers: ASTM F 436 hardened carbon steel.
 4. Finish: Plain.
- C. Threaded Rods: ASTM A 36/A 36M.
1. Nuts: ASTM A 563 heavy hex carbon steel.
 2. Washers: ASTM F 436 hardened carbon steel.
 3. Finish: Plain.

2.03 PRIMER

- A. Primer for structural steel: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.
- B. Primer for architecturally exposed structural steel: 90-97 Tneme-Zinc.
- C. Galvanizing Repair Paint: ASTM A 780.

2.04 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.05 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings".
1. Camber structural-steel members where indicated.
 2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
 3. Mark and match-mark materials for field assembly.
 4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
 2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning."
- G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.06 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened unless noted otherwise.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
 - c. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

2.07 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials.
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning," structural steel.
 2. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," architecturally exposed structural steel.
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils (3.0 mils at architecturally exposed structural steel). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that will be made inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.08 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
 1. Fill vent holes and grind smooth after galvanizing.

2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings".
- B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
 3. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.04 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened unless noted otherwise.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
 - c. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds, high-strength bolted connections, and post-installed anchor installation.
- B. Bolted Connections: Field-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.06 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION

SECTION 05310

STEEL DECK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.
- B. Related Sections include the following:
 - 1. Division 05 Section "Structural Steel Framing".

1.03 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.01 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 2. Deck Profile: As indicated.
 - 3. Profile Depth: As indicated.
 - 4. Design Uncoated-Steel Thickness: As indicated.
 - 5. Span Condition: Triple span or more.
 - 6. Side Laps: Overlapped.

2.02 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 12 minimum diameter.
- C. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- F. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- G. Galvanizing Repair Paint: ASTM A 780 for roof deck welds after welds have been inspected by Special Inspector.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.02 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.

- B. Locate deck bundles to prevent overloading of supporting members.
- C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.03 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members as indicated.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Fasten to substrate to provide a complete deck installation.
 - 1. Fasten cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds and mechanical fasteners will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.05 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on top surface of roof deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions. This applies at all roof deck welds.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05400

COLD FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall framing.
- B. Exterior wall sheathing.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.
- C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.
- D. ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2007.
- E. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2006.
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- C. Manufacturer's Installation Instructions: Indicate special procedures, conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. Dietrich Metal Framing: www.dietrichindustries.com.
 - 2. MarinoWare: www.marinoware.com.
 - 3. The Steel Network, Inc: www.SteelNetwork.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C 955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Gage and depth: As scheduled.
 - 2. Galvanized in accordance with ASTM A 653/A 653M G90/Z275 coating.
- B. Framing Connectors: Factory-made formed steel sheet, ASTM A 653/A 653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.
 - 1. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold Formed Steel Structural Members; minimum 16 gage, 0.06 inch thickness.
 - 2. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, screws and anti-friction bushings, while maintaining structural performance of framing. Provide movement connections at the following locations:
 - a. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - b. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
 - 3. Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.04 WALL SHEATHING

- A. Wall Sheathing: Glass mat faced gypsum; ASTM C 1177/C 1177M, square long edges, 1/2 inch.

2.05 ACCESSORIES

- A. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.06 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A 153/A 153M.
- B. Anchorage Devices: Power actuated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C 1007 requirements.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place with fasteners at maximum 24 inches on center. Coordinate installation of sealant with floor and ceiling tracks.

- C. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- D. Install load bearing studs full length in one piece. Splicing of studs is not permitted.
- E. Install load bearing studs, brace, and reinforce to develop full strength and achieve design requirements.
- F. Install intermediate studs above and below openings to align with wall stud spacing.
- G. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- H. Attach cross studs to studs for attachment of fixtures anchored to walls.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged galvanized surfaces with primer.

3.03 WALL SHEATHING

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04810 - Unit Masonry Assemblies: Placement of metal fabrications in masonry.
- C. Section 05520 - Handrails and Railings.
- D. Section 09900 - Paints and Coatings: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.
- B. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.
- C. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).
- D. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A 36/A 36M.
- B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATED ITEMS

- A. Lintels: As detailed; prime paint finish.
- B. Toilet Partition Suspension Members: As required by partition manufacturer; Steel channel sections; prime paint finish.
- C. Bathroom Vanity Supports: Steel tube and bar sections; prime paint finish.

2.03 FINISHES - STEEL

- A. Prime paint all steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete or masonry.

- B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- C. Prime Painting: One coat.
- D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements.

2.04 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.
- D. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

END OF SECTION

SECTION 05520

HANDRAILS AND RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Free-standing railings at steps.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - Cast-in-Place Concrete: Placement of anchors in concrete.

1.03 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 1998.
- B. ASTM B 241/B 241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube; 2002.
- C. ASTM B 429/B 429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2006.
- D. ASTM B 483/B 483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tubes and Pipe for General Purpose Applications; 2003.
- E. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- F. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Samples: Submit two, 6 inch long samples of handrail. Submit two samples of elbow, wall bracket, and end stop.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Handrails and Railings:
 - 1. C. R. Laurence Co., Inc: www.crlaurence.com.
 - 2. Sterling Dula Architectural Products: www.sterlingdula.com.
 - 3. The Wagner Companies: www.wagnercompanies.com.

2.02 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E 985 and applicable local code.
- B. Design railing assembly, wall rails, and attachments to resist lateral force of 75 lbs at any point without damage or permanent set. Test in accordance with ASTM E 935.

- C. Allow for expansion and contraction of members and building movement without damage to connections or members.
- D. Dimensions: See drawings for configurations and heights.
 - 1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
 - 2. Intermediate Rails: 1-1/2 inches diameter, round.
 - 3. Posts: 1-1/2 inches diameter, round.
- E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
- F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.03 ALUMINUM MATERIALS

- A. Aluminum Pipe: Schedule 40; ASTM B 429/B 429M, ASTM B 241/B 241M, or ASTM B 483/B 483M.
- B. Aluminum Tube: Minimum wall thickness of 0.127 inch; ASTM B 429/B 429M, ASTM B 241/B 241M, or ASTM B 483/B 483M.
- C. Welding Fittings: No exposed fasteners; cast aluminum.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.05 ALUMINUM FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick. Satin finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Apply two coats of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05581

METAL COLUMN COVERS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Furnish all labor, materials, equipment and incidentals required to install column covers, in accordance with the contract drawings and details to insure a weather-tight system. Column Cover supplier shall be responsible for the design of the Column Cover System, including, but not limited to, the anchorage details, sealant recommendations, and expansion/contraction provisions for system.
- B. Provide formed metal column covers and/or beam wraps as shown on drawings. Contractor to coordinate requirements, quantities and sizes with structural drawings.

1.02 RELATED SECTIONS

Not included as work or materials furnished in this section:

- A. Structural Steel, Section 05120.
- B. Gypsum Board Assemblies, Section 09260.
- C. Joint Sealers, Section 07900.

1.03 REFERENCES

- A. The manufacturer will be a firm regularly engaged in the fabrication of custom aluminum columns cover systems.

1.04 SUBMITTALS

- A. Submit copies of manufacturer's standard guide specifications, standard detail drawings and installation procedures.
- B. Submit certified test reports verifying the performance requirements.
- C. Submit shop drawings showing small scale layout and elevations of the total project. Details shall include attachment to the support system, include all information necessary for fabrication and recommendation for installation of column covers. Indicate materials, sizes, thickness, fastenings and profiles. Show details of sealing at edges, termination, penetrations and connections to adjacent materials.
- D. Submit (2) 4"x4" minimum product samples showing the proposed material, color, and finish.

1.05 QUALITY ASSURANCE

- A. The installer shall be an experienced installation firm acceptable to the panel manufacturer.
- B. Reference to ASTM standards shall mean the latest edition of those standards.

- C. Any reference to specific manufacturers is not intended to restrict bidding but rather to establish a minimum standard of quality and offer clarification of panel profiles. Manufacturers not listed must obtain the written approval of the architect a minimum of 7 days prior to the bid. Such request for approval must be in accordance with paragraph 1.3 of this section and the general conditions.

1.06 PROJECT CONDITIONS

- A. Field Measurements Verify actual supporting and adjoining construction by field measurements before fabrication, and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that Column Covers fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.
- B. Established dimensions: where field measurements can not be made without delaying the work, guaranteed dimensions shall be provided to manufacturer to proceed with fabrication of Column Covers corresponding to the established dimensions.

PART 2 – PRODUCTS

2.01 MANUFACTURER

- A. Manufacturers: Subject to compliance with requirements, provide products manufactured by:
1. Alumafab: www.alumafab.com.
 2. Alucobond: www.alucobondusa.com
 3. Doralco: www.doralco.com
 4. Metal Design Systems, Inc. www.metaldesignsystems.com
 5. Southern Aluminum Finishing Company, Inc.: www.saf.com
- B. The Column Covers shall be installed in accordance with the details illustrated on the contract drawings. The vertical and horizontal joints shall be sealed through the use of exposed sealants as indicated. The column covers shall be positively attached to the building structure on the panel edges.
1. The basis of design product is AF-2000 Aluminum Column Covers by Alumafab.

2.02 PANEL ASSEMBLY

- A. The basic panel shall consist of custom fabricated, solid aluminum column covers, in thicknesses, lengths, widths and finish as illustrated on the contract drawings.
1. Each course to be fabricated in two or more vertical sections (typically halves) with butt joints. Fold back ends of sheet metal to form a 1" wide return leg on the concealed side
 2. AF2000 hairline joint utilizing key slot "Sur-Loc System". Design and fabricate work to permit its installation on fully concealed mounting devices.
 3. Bump forming of column cover will not be permitted unless prior written approval of Architect.
 4. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise damaging the work.

5. Provide straps, plates and brackets as required for support and anchorage of fabricated items.
- B. Covers shall be .125" aluminum 5005 AQ alloy, H32 temper. Top and bottom rings shall be welded construction. Horizontal butt joints with no reveals or caulk reveals shall be a minimum of 1/2" wide.

2.03 FINISH

- A. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.
- B. All exposed surfaces shall be protected with a strippable coating.
 1. The strippable coating shall be compatible with the exterior finish.
 2. The strippable coating shall be removed by the erector immediately upon installation of the panels.

2.04 ACCESSORIES

- A. Fasteners
 1. All panels shall be positively attached to the structure through the use of concealed fasteners contained within the side joint of the assembly. Installer to provide stainless steel screws and fasteners for aluminum column covers.
 2. No exposed fasteners will be accepted, unless noted otherwise.
 3. Fastener types and sizes shall be designed to resist negative & positive wind loads.
- B. Sealants
 1. All sealants shall be in accordance with the latest ASTM standards and shall comply with the sealant specifications of the contract documents.
- C. Subgirts & Clips
 1. Subgirts and clips shall be furnished as part of the scope of this work as required to provide a complete Column Cover assembly.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation.
- B. Substructure shall be structurally sound and shall be free of defects detrimental to work and erected in accordance with established building tolerances.

3.02 INSTALLATION

- A. Comply with panel manufacturer's instruction for installation and erection of preformed metal panels. Install in accordance with approved shop drawings.
- B. Anchor component parts securely in place, providing for necessary thermal and structural movement.

- C. Examine structure and surfaces for defects that would prevent proper installation of the wall system. Report any discrepancies to the architect and contractor. Do not proceed until the remedial work has been completed.
- D. All fasteners shall be installed in accordance with the materials specification above.
- E. Covers to be secured to substrate by use of formed aluminum clips utilizing angle, adjustable angle or zee shapes. Number of clips required to be determined by manufacturer's standard practice.
- F. Isolate dissimilar materials in accordance with acceptable industry practices and as recommended by panel manufacturer.

3.03 CLEANING

- A. Touch-up damaged finishes.
- B. Cleaning and maintenance per maintenance instructions.

3.04 DAMAGED COLUMN COVERS

- A. Repair or replace any and all Column Covers and trim that have been damaged.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof-mounted curbs.
- B. Roofing nailers.
- C. Preservative treated wood materials.
- D. Fire retardant treated wood materials.
- E. Miscellaneous framing and sheathing.
- F. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

- A. Section 09260 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Protection Association; 2007.
- C. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E 84.

2.04 FACTORYWOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Fire Retardant Treatment:
 - 1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E 84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber in contact with roofing, flashing, or waterproofing.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- D. Specifically, provide the following non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Handrails.
 - 4. Grab bars.
 - 5. Towel and bath accessories.
 - 6. Wall-mounted door stops.
 - 7. Chalkboards and marker boards.
 - 8. Joints of rigid wall coverings that occur between studs.

3.03 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

3.04 INSTALLATION OF CONSTRUCTION PANELS

- A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.
 - 4. Size and Location: As indicated on drawings, entire wall height from top of base to ceiling.

3.05 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.06 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01732.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06410

CUSTOM CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.
- C. Factory finishing.
- D. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 06415 - Countertops.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- B. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- C. PS 1 - Structural Plywood; 2007.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual sample items of proposed pulls, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.
- B. Manufacturer Qualifications: Member in good standing of the Architectural Woodwork Institute (AWI) and familiar with the AWI/AWMAC QSI.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.07 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.02 PANEL MATERIALS

- A. Plywood for Non-Decorative Purposes: NIST PS 1, Interior rated adhesives, core of wood plies from listed species unless otherwise indicated, thickness as indicated or as required by application.
 - 1. Concealed Surfaces: PS 1; APA B-B Grade, rotary cut Douglas fir face veneer.

2.03 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Formica Corporation: www.formica.com.
 - 2. Panolam Industries International, Inc\Nevamar: www.nevamar.com.
 - 3. Wilsonart International, Inc: www.wilsonart.com.
 - 4. Abet Laminati: www.abetlaminati.com.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as scheduled.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic grommets for cut-outs, in color as selected from manufacturer's full range.

2.05 HARDWARE

- A. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
- B. Drawer and Door Pulls: Nickel Plated Zinc matt finish.
 - 1. Basis of Design Product: 104.09.600 manufactured by Hafele.
- C. Drawer Slides:
 - 1. Type: Full extension.
 - 2. Static Load Capacity: Extra Heavy Duty grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Manufacturers:
 - a. Accuride International, Inc: www accuride.com.
 - b. Grass America Inc: www.grassusa.com.
 - c. Knappe & Vogt Manufacturing Company: www.knappeandvogt.com.
 - d. Hafele: www.hafele.com
- D. Hinges: European style concealed type, steel with satin finish.
 - 1. Manufacturers:
 - a. Grass America Inc: www.grassusa.com.
 - b. Hardware Resources: www.hardwareresources.com.
 - c. Julius Blum, Inc: www.blum.com.

d. Hafele: www.hafele.com

2.06 FABRICATION

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors and Drawer Fronts: Flush style.
- C. Drawer Construction Technique: Dovetail joints.
- D. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- G. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
- H. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
 - 1. Provide center matched panels at each elevation.
- I. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.07 FACTORY FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.
- C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.
- D. Finish work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1500, Nitrocellulose Lacquer, Transparent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 06415

COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinetwork.

1.02 RELATED REQUIREMENTS

- A. Section 06410 - Custom Cabinets.
- B. Section 15410 - Plumbing Fixtures: Sinks.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC (QSI) - Quality Standard Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- B. ISSFA-2 - Classification and Standards for Solid Surfacing Material; International Solid Surface Fabricators Association; 2001 (2002)
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- D. PS 1 - Structural Plywood; 2007.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

- A. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.
 - 1. Laminate Sheet, Unless Otherwise Indicated: NEMA LD 3 Grade HGS, 0.048 inch nominal thickness.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.
 - b. Surface Color and Pattern: As indicated on drawings.
 - c. Manufacturers:
 - 1) Formica Corporation: www.formica.com.
 - 2) Lamin-Art, Inc: www.laminart.com.
 - 3) Panolam Industries International, Inc\Nevamar: www.nevamar.com.
 - 4) Panolam Industries International, Inc\Pionite: www.pionitelaminates.com.
 - 5) Wilsonart International, Inc: www.wilsonart.com.
 - 2. Exposed Edge Treatment: Square, substrate built up to minimum 1-1/4 inch thick; covered with matching laminate.
 - 3. Back and End Splashes: Same material, same construction.
 - 4. Fabricate in accordance with AWI/AWMAC Quality Standards Illustrated Premium Grade.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
 - 1. Flat Sheet Thickness: 1/2 inch, minimum.
 - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISSFA-2 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
 - a. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
 - b. Color and Pattern: As indicated on drawings.
 - c. Manufacturers:
 - 1) Dupont: www.corian.com.
 - 2) Formica Corporation: www.formica.com.
 - 3) Avonite Surfaces: www.avonitesurfaces.com.
 - 4) Staron Solid Surfaces: www.staron.com.
 - 3. Other Components Thickness: 1/2 inch, minimum.
 - 4. Exposed Edge Treatment: Built up to minimum 1 1/2 inch thick; square edge; use marine edge at sinks.
 - 5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
 - 6. Skirts: As indicated on drawings.

2.02 ACCESSORY MATERIALS

- A. Wood-Based Components:
 - 1. Wood fabricated from old growth timber is not permitted.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 1/2 inch thick; join lengths using metal splines.
- C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- D. Cove Molding for Top of Splashes: Rubber with semi-gloss finish and T-spline to fit between splash and wall; 1/2 inch by 1/2 inch.
- E. Cove Molding for Top of Splashes: Rubber with semi-gloss finish and T-spline to fit between splash and wall; 1/2 inch by 1/2 inch; color as selected.
- F. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Seal joint between back/end splashes and vertical surfaces.
 - 1. Where indicated use rubber cove molding.
 - 2. Where applied cove molding is not indicated use specified sealant.

3.04 CLEANING

- A. Clean countertops surfaces thoroughly.

3.05 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 07162

CRYSTALLINE WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Crystalline waterproofing.
- B. Preparation of surfaces to be waterproofed, including plugging active water leaks.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - Cast-in-Place Concrete: Concrete work to be waterproofed.
- B. Section 04810 - Unit Masonry Assemblies: Concrete masonry work to be waterproofed.

1.03 REFERENCE STANDARDS

- A. COE CRD-C 48 - Standard Test Method for Water Permeability of Concrete; 1992.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Test data showing hydraulic permeability.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
 - 5. Details for waterproofing at joints, intersections, and other special conditions.
- C. Specimen warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of products of the type specified.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Take necessary precautions to keep cementitious materials dry.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide installer's warranty agreeing to correct leaking waterproofing for 2 years from the Date of Substantial Completion, unless leakage is caused by structural failure, movement of the structure, or other causes beyond the installer's control.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Waterproofing for building surfaces:

1. Inside of footings and foundation walls.

2.02 MATERIALS

- A. Crystalline Waterproofing: Portland cement and chemical compound that when applied to the surface of concrete forms insoluble crystals in the capillary pores preventing the passage of liquids, while having no adverse effect on the normal properties of concrete.
 1. Hydraulic Permeability: No measurable leakage or water flow at 200 psi pressure when tested in accordance with COE CRD-C 48, using minimum 2 inch thick sample and 20 days duration.
 2. Toxicity: Non-toxic.
 3. Color: Gray.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Use sand blasting, water blasting, or acid etching as recommended.
- C. Plug water leaks.
- D. Patch holes, construction joints, and cracks. Remove defective concrete.

3.03 INSTALLATION

- A. Install in strict accordance with manufacturer's instructions. Maintain environmental conditions required and recommended by manufacturer. Keep a copy of manufacturer's instructions on site.
- B. Coordinate installation with installation of products that must penetrate waterproofed surfaces.
- C. Prevent excessive drying of surface.
 1. Cure waterproofing for at least 3 days, or length of time required by manufacturer, with water spray and adequate air circulation.
 2. Do not use chemical curing agents unless explicitly approved by waterproofing manufacturer.
- D. Do not backfill, fill water or liquid holding structures, or apply finish coatings until time period recommended by manufacturer has passed.

END OF SECTION

SECTION 07210

FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Foamed-in-place insulation in cavities of concrete masonry unit (CMU) walls.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
2. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics.
3. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
4. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
5. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
6. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.
7. ASTM E413 Standard Classification for Rating Sound Insulation.

1.3 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions, including the following:
1. Product description, insulation properties, preparation and storage requirements.
 2. Requirements and procedures for site installation, including equipment and accessories.
- C. Quality Assurance/Control Submittals: Submit the following:
1. Test Reports/Listing: Provide product test reports and product listing from an approved testing agency.
 2. Certificates:
 - a. Manufacturer's certification that product meets or exceeds specified requirements.
 - b. Manufacturer's certification that applicator is trained in installation of product and is authorized by manufacturer to install product.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Applicator Qualifications: Utilize a qualified applicator with demonstrated experience in performing work comparable to the work of this section, and who is trained and authorized by the manufacturer to install the product.
 - 2. Product is to be listed by an approved testing agency.
- B. Certifications: Manufacturer certification that product complies with requirements of this section.

1.5 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials to applicator in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer. Product should be stored in paper sacks and protected from any water source until blending by installer.
- D. Recycling:
 - 1. Ship materials in containers that are readily recyclable.
 - 2. Waste insulation materials must be biodegradable, suitable for public landfill disposal.

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Do not install foam insulation when product temperature is below 50 degrees F (10 degrees C).

PART 2 - PRODUCTS

2.1 FOAMED-IN-PLACE BUILDING INSULATION

- A. Manufacturer
 - 1. PolyMaster, Inc.
 - 2. Taylored Foam
 - 3. Thermco
- B. Proprietary Products/Systems. Foamed-in-place building insulation, including the following:
 - 1. Foam Insulation:
 - a. Formulation: 3 part polymer foamed-in-place plastic insulation consisting of a proprietary dry powder resin, mixed by the applicator with a catalyst and foamed with compressed air.
 - b. Thermal Properties: K-value and R-value per inch thickness at 25 degrees F (-4 degrees C) (ASTM C518): K-value $0.216 \text{ Btu}/(\text{ft}^2 \times \text{h} \times \text{deg F})$ ($0.37 \text{ W}/(\text{m} \times \text{K})$). R-value $4.63 \text{ ft}^2 \times \text{h} \times \text{deg F}/\text{Btu}$ ($0.81 \text{ m}^2 \times \text{K}/\text{W}$).

- c. Thermal Properties: K-value and R-value per inch thickness at 75 degrees F (24 degrees C) (ASTM C518): K-value $0.244 \text{ Btu}/(\text{ft}^2 \times \text{h} \times \text{deg F})$ ($0.42 \text{ W}/(\text{m} \times \text{K})$). R-value $4.09 \text{ ft}^2 \times \text{h} \times \text{deg F}/\text{Btu}$ ($0.72 \text{ m}^2 \times \text{K}/\text{W}$).
- d. Water Vapor Transmission (ASTM E96): $4.655 \text{ grains}/\text{hr} \times \text{ft}^2$.
- e. Permeance (ASTM E96): $6.631 \text{ perms}/\text{inch}$ ($381 \text{ ng}/(\text{Pa} \times \text{s} \times \text{m}^2)$).
- f. Average Permeability (ASTM E96): 15.749
- g. Water Vapor Absorption (ASTM D2842): 10% by volume at 24 hours, at 25 degrees F (-4 degrees C), at 100% relative humidity.
- h. Surface Burning Characteristics (ASTM E84): Flamespread 25, smoke developed 40, thickness 1" (25.4 mm).
- i. Building Code Surface Burning Classification: Class I or Class A.
- j. Shrinkage: 2% maximum.
- k. Corrosivity: Noncorrosive.
- l. Asbestos or Glass Fiber Content: None.
- m. Off-Gassing or Odors: None.
- n. Biodegradability: Biodegradable.

2.2 PRODUCT SUBSTITUTIONS

- A. Substitutions: As outlined in the General Conditions of the Contract.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the instructions and recommendations of the foamed-in-place building insulation manufacturer and approved testing agency product listing.

3.2 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Ensure cores or spaces are free of mortar or other restrictions to the free flow of foam insulation.
 - 2. Verify that all work within the wall voids is complete prior to installation.
 - 3. Verify that masonry cells do not contain water.

3.3 PREPARATION

- A. Allow masonry mortar to set prior to installing insulation.
- B. Select most aesthetically pleasing locations for foam injection, including:
 - 1. Locations to be concealed where possible:
 - a. Masonry joints.
 - b. Wythe side of walls.
 - c. Covered side of walls.
- C. For pressure fill installation, drill fill holes into CMU cores.

1. Drill Hole Size: Minimum diameter 5/8" (15.9 mm), maximum diameter 2" (51 mm).
- D. For 8" (203 mm) CMU, drill every other core. For 12" (305 mm) CMU, drill every core.

3.4 INSTALLATION

- A. Install foam insulation in CMU cores using Pressure fill method to a uniform density. Completely fill all spaces, crevices and voids.
- B. Fill and point drill holes in exposed or concealed masonry units with mortar after installation, shaping and texturing to match existing materials.

3.5 FIELD QUALITY CONTROL

- A. Site Tests: Verify insulation density of each foam batch by random sampling of foam before installation.
 1. Fill a 1 gal (3.8 L) nonsealing plastic bag with foam.
 2. The bag weight shall be between 285 - 325 grams.
- B. Inspection: Verify complete filling of voids by drilling or removing block face upon request.
 1. Fill and point drill holes in masonry with mortar after inspection.
- C. Correct any foam installation found not to be in compliance with manufacturer's requirements.

3.6 CLEANING

- A. After foam insulation sets, remove excess insulation outside of cavity. Properly and legally dispose of waste with other construction waste material.

3.7 PROTECTION

- A. Do not permit subsequent construction to damage or disturb installed foam insulation.
- B. Do not paint masonry walls until at least 72 hours after installation of foam insulation.

END OF SECTION

SECTION 07212

BOARD AND BATT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at perimeter foundation wall and underside of floor slabs.
- B. Batt insulation in exterior and fire rated wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 REFERENCE STANDARDS

- A. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2007.
- B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.
- D. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2004.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene board.
- B. Insulation at Perimeter of Foundation: Expanded polystyrene board.
- C. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene Board Insulation: ASTM C 578, Type X; Extruded polystyrene board with either natural skin or cut cell surfaces; with the following characteristics:
 - 1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E 84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.
 - 3. Board Size: 48 x 96 inch.
 - 4. Board Thickness: 2 inches.
 - 5. Board Edges: Square.
 - 6. Water Absorption, maximum: 0.3 percent, volume.
 - 7. Manufacturers:
 - a. Dow Chemical Co: www.dow.com.
 - b. Owens Corning Corp: www.owenscorning.com.
 - c. Pactiv Building Products: www.pactiv.com/green-guard/.
 - 8. Substitutions: See Section 01600 - Product Requirements.

2.03 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C 665; friction fit.
 - 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E 84.
 - 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.
 - 3. Combustibility: Non-combustible, when tested in accordance with ASTM E 136.
 - 4. Thermal Resistance: R of 13.
 - 5. Facing: Aluminum foil, flame spread 25 rated; one side.
 - 6. Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville Corporation: www.jm.com.
 - c. Knauf Insulation GmbH: www.knaufinsulation.us.
 - d. Owens Corning Corp: www.owenscorning.com.
 - 7. Substitutions: See Section 01600 - Product Requirements.
- B. Mineral Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C 665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E 84.
 - 1. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E 84.
 - 2. Thickness: As required by the fire rated assembly design.

2.04 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.
- B. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Install boards horizontally on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.04 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.
- F. Tape insulation batts in place.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.
- H. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.
- I. Tape seal tears or cuts in vapor retarder.
- J. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

3.05 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07240

EXTERIOR INSULATION AND FINISH SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Composite wall cladding of rigid insulation and reinforced finish coating ("Class PB").

1.02 RELATED REQUIREMENTS

- A. Section 07900 - Joint Sealers: Perimeter and penetration sealants.

1.03 REFERENCE STANDARDS

- A. ASTM B 117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2007a.
- B. ASTM C 297/C 297M - Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions; 2004.
- C. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2007.
- D. ASTM C 1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems; 2005.
- E. ASTM D 968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive; 2005.
- F. ASTM D 2247 - Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity; 2002.
- G. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2000 (Reapproved 2005).
- H. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.
- I. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000.
- J. ASTM E 2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies; 2003.
- K. ASTM E 2486 - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS); 2006.
- L. ASTM G 153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2004.
- M. ASTM G 155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2005a.
- N. ICC-ES AC219 - Acceptance Criteria for Exterior Insulation and Finish Systems; 2004 (Editorially revised 2006 & 2007 and April 2008).
- O. NFPA 259 - Standard Test Method for Potential Heat Building Materials; 2008.
- P. NFPA 268 - Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source; 2007.
- Q. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2006.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate wall joint patterns, joint details, and molding profiles.
- C. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.
- D. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.
- E. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.
- F. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

1.05 QUALITY ASSURANCE

- A. Maintain copy of specified installation standard and manufacturer's installation instructions at project site at all times during installation.
- B. EIFS Manufacturer Qualifications: Provide all EIFS products other than insulation from the same manufacturer with qualifications as follows:
 - 1. Member in good standing of EIMA (EIFS Industry Members Association).
- C. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.
- D. Installer Qualifications: Company specializing in EIFS work and approved by the EIFS manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.
- B. Storage: Protect adhesives and finish materials from freezing and temperatures in excess of 90 degrees F.
 - 1. Protect Portland cement based materials from moisture and humidity. Store under cover off the ground in a dry location.
 - 2. Protect insulation materials from exposure to sunlight.

1.07 FIELD CONDITIONS

- A. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.
- B. Do not install coatings or sealants when ambient temperature is below 40 degrees F.
- C. Do not leave installed insulation board exposed to sunlight for extended periods of time.

1.08 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's standard material warranty, covering a period of not less than 10 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design; System Dryvit Outsulation MD.

- B. Acceptable Manufacturers:
1. ParexLahabra, Inc: www.parex.com.
 2. BASF Wall Systems (Senergy, Finestone, Acrocrete, SonoWall): www.wallsystems.basf.com.
 3. STO Corp: www.stocorp.com.
 4. Substitutions: See Section 01600 - Product Requirements.

2.02 EXTERIOR INSULATION AND FINISH SYSTEM

- A. Exterior Insulation and Finish System: DRAINAGE type; reinforced finish coating on insulation board with drainage grooves adhesive-applied to water-resistive coating over substrate; provide a complete system that has been tested to show compliance with the following characteristics; include all components of specified system and substrate(s) in tested samples.
- B. Fire Characteristics:
1. Flammability: Pass, when tested in accordance with NFPA 285.
 2. Ignitibility: No sustained flaming when tested in accordance with NFPA 268.
 3. Potential Heat of Foam Plastic Insulation Tested Independently of Assembly: No portion of the assembly having potential heat that exceeds that of the insulation sample tested for flammability (above), when tested in accordance with NFPA 259 with results expressed in Btu per square foot.
- C. Adhesion of Water-Resistive Coating to Substrate: For each combination of coating and substrate, minimum flatwise tensile bond strength of 15 psi, when tested in accordance with ASTM C 297/C 297M.
- D. Adhesion to Water-Resistive Coating: For each combination of insulation board and substrate, when tested in accordance with ASTM C 297/C 297M, maximum adhesive failure of 25 percent unless flatwise tensile bond strength exceeds 15 psi in all samples.
- E. Water Penetration Resistance: No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes, when tested in accordance with ASTM E 331 at 6.24 psf differential pressure with tracer dye in the water spray; include in tested sample at least two vertical joints and one horizontal joint of same type to be used in construction; disassemble sample if necessary to determine extent of water penetration.
- F. Drainage Efficiency: Average minimum efficiency of 90 percent, when tested in accordance with ASTM E 2273 for 75 minutes.
- G. Salt Spray Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 300 hours exposure in accordance with ASTM B 117, using at least three samples matching intended assembly, at least 4 by 6 inches in size.
- H. Freeze-Thaw Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 10 cycles, when tested in accordance with ICC-ES AC 219 or 235.
- I. Weathering Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating when viewed under 5x magnification after 2000 hours of accelerated weathering conducted in accordance with ASTM G 153 Cycle 1 or ASTM G 155 Cycle 1, 5, or 9.
- J. Water Degradation Resistance: No cracking, checking, crazing, erosion, blistering, peeling, delamination, or corrosion of finish coating after 14 days exposure, when tested in accordance with ASTM D 2247.
- K. Mildew Resistance: No growth supported on finish coating during 28 day exposure period, when tested in accordance with ASTM D 3273.

- L. Abrasion Resistance Of Finish: No cracking, checking or loss of film integrity when tested in accordance with ASTM D 968 with 500 liters of sand.
- M. Impact Resistance: Construct system to provide the following impact resistance without exposure of broken reinforcing mesh, when tested in accordance with ASTM E 2486:
 - 1. Standard: 25 to 49 in-lb, for areas not indicated as requiring higher impact resistance.
 - 2. High: 90 to 150 in-lb, for areas within 4'-0" of grade.

2.03 MATERIALS

- A. Finish Coating Top Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
 - 1. Color: As selected from manufacturer's range of standard colors.
- B. Base Coat: Fiber-reinforced, acrylic or polymer-based product compatible with insulation board and reinforcing mesh.
- C. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.
- D. Insulation Board: Molded, expanded polystyrene board; ASTM C 578, Type I; with the following characteristics:
 - 1. Grooved Board: Back side of board adjacent to sheathing grooved with vertical channels designed to allow moisture to drain; at drainage points provide board configuration that permits drainage to the exterior.
 - 2. Board Size: 24 by 48 inches.
 - 3. Board Size Tolerance: plus/minus 1/16 inch from square and dimension.
 - 4. Board Thickness: As indicated on drawings.
 - 5. Thickness Tolerance: plus/minus 1/16 inch maximum.
 - 6. Board Edges: Square.
 - 7. Thermal Resistance (R factor per 1 in (25.4 mm)) at 75 degrees F: 3.60.
 - 8. Board Density: 0.9 lb/cu ft.
 - 9. Compressive Resistance: 10 psi.
 - 10. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, when tested in accordance with ASTM E 84.
- E. Water-Resistive Barrier: Fluid-applied coating forming air and water barrier membrane; applied to sheathing; furnished or approved by EIFS manufacturer.
- F. Flashing Tape: Self-adhering rubberized asphalt tape with polyethylene backing or other material furnished or approved by EIFS manufacturer.

2.04 ACCESSORY MATERIALS

- A. Insulation Adhesive: Type required by EIFS manufacturer for project substrate.
- B. Trim: EIFS manufacturer's standard galvanized steel trim accessories, as required for a complete project and including starter track, and drainage accessories.
- C. Sealant Materials: As recommended by EIFS manufacturer.

PART 3 EXECUTION

3.01 GENERAL

- A. Install in accordance with EIFS manufacturer's instructions and ASTM C 1397.
- B. Where different requirements appear in either document, comply with the most stringent.

- C. Neither of these documents supercedes the provisions of the Contract Documents that define the contractual relationships between the parties or the scope of work.

3.02 EXAMINATION

- A. Verify that substrate is sound and free of oil, loose materials, or protrusions that could interfere with EIFS installation and is of a type and construction that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are complete and thoroughly dry.
- B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

3.03 INSTALLATION- WATER-RESISTIVE BARRIER

- A. Apply barrier coating as recommended by coating manufacturer; prime substrate as required before application.
- B. Seal all substrate transitions and intersections with other materials to form continuous water-resistive barrier on exterior of sheathing, using method recommended by manufacturer.
- C. At door and window openings, seal water-resistive barrier to rough opening structure before installation of metal flashings, sills, or frames, using method recommended by manufacturer.
- D. At moving expansion joints, apply flashing tape across and recessed into joint with U-loop forming continuous barrier but allowing movement.
- E. Lap flashing tape at least 2 inches on each side of joint or transition.

3.04 INSTALLATION- INSULATION

- A. Install in accordance with manufacturer's instructions.
- B. Install back wrap reinforcing mesh at all openings and terminations that are not to be protected with trim.
- C. On wall surfaces, install boards horizontally.
- D. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.
- E. Rasp irregularities off surface of installed insulation board.
- F. Adhesive Attachment: Use method recommended by EIFS manufacturer.

3.05 INSTALLATION- FINISH

- A. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at all terminations of the EIFS. Install reinforcing fabric as recommended by EIFS manufacturer.
 - 1. Lap reinforcing mesh edges and ends a minimum of 2-1/2 inches.
 - 2. Allow base coat to dry a minimum of 24 hours before next coating application.
- B. Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.
- C. Finish Coat Thickness: As recommended by manufacturer.
- D. Apply sealant at finish perimeter and expansion joints in accordance with Section 07900.

3.06 CLEANING

- A. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

END OF SECTION

SECTION 07410

METAL WALL PANELS

PART 1 – GENERAL

1.01 SCOPE

A. Section Includes:

1. The extent of panel system work is indicated on the drawings and in these specifications.
2. Panel system requirements include the following components:
 - a. Aluminum faced composite panels with mounting system. Panel mounting system including anchorages, shims, furring, fasteners, gaskets and sealants, related flashing adapters, and masking (as required) for a complete watertight installation.
 - b. Parapet coping, column covers, soffits, sills, border, and filler items indicated as integral components of the panel system or as designed.

B. Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 1 Specification Sections, and Technical Specification Divisions 2 through 16 apply to this Section.

C. Related Work Specified Elsewhere

- | | |
|-------------------|-------------------------------|
| 1. Section 05120: | Structural steel |
| 2. Section 06100: | Rough Carpentry |
| 3. Section 07212: | Board and Batt Insulation |
| 4. Section 07620: | Sheet metal flashing and trim |
| 5. Section 07900: | Joint Sealers |
| 6. Section 09900: | Paints and Coatings |

1.02 QUALITY ASSURANCE

- A. Composite Panel Manufacturer shall specialize in the manufacturing of this product.
- B. Composite Panel Manufacturer shall be solely responsible for panel manufacture and application of the finish.
- C. Fabricator/installer shall be acceptable to the composite panel manufacturer.
- D. Field measurements should be taken prior to the completion of shop fabrication whenever possible. However, coordinate fabrication schedule with construction progress as directed by the Contractor to avoid delay of work. Field fabrication may be allowed to ensure proper fit. However, field fabrication shall be kept to an absolute minimum with the majority of the fabrication being done under controlled shop conditions.
- E. Shop drawings shall show the preferred joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on the inside face of the panel system as determined by ASTM E 331.
- F. Maximum deviation from vertical and horizontal alignments of erected panels: 6mm (1/4" in 6m (20") non-accumulative.

- G. Panel fabricator/installer shall assume undivided responsibility for all components of the exterior panel system including, but not limited to attachment to sub-construction, panel to panel joinery, panel to dissimilar material joinery, and joint seal associated with the panel system.
- H. Composite panel manufacturer shall have established a Certification Program acceptable to the local Code Authorities.

1.03 REFERENCES

A. Aluminum Association

- 1. AA-C22-A41: Anodized - Clear Coatings.
- 2. AA-C22-A42: Anodized - Integral Color Coatings.

B. American Architectural Manufacturers Association

- 1. AAMA 508-05: Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems

C. American Society For Testing And Materials

- 1. E 330 Structural Performance of Exterior Windows, Curtain Walls, and Doors Under the Influence of Wind Loads
- 2. E 283 Rate of Leakage through Exterior Windows, Curtain Walls, and Doors
- 3. D 1781 Climbing Drum Peel Test for Adhesives
- 4. E 84 Surface Burning Characteristics of Building Materials
- 5. D 3363 Method for Film Hardness by Pencil Test
- 6. D 2794 Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- 7. D 3359 Methods for Measuring Adhesion by Tape Test
- 8. D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- 9. B 117 Method of Salt Spray (Fog) Testing
- 10. D 822 Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products
- 11. D 1308 Effect of Household Chemicals on Clear and Pigmented Organic Finishes
- 12. D 1735 Method for Water Fog Testing of Organic Coatings.
- 13. D 1929 Standard Test Method for Determining Ignition Temperature of Plastics
- 14. D 635 Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position

1.04 SUBMITTALS

A. Submittals shall be in conformance with Section 01300-Administrative Requirements.

B. Samples

- 1. Panel System Assembly: Two samples of each type of assembly. 304mm (12") x 304mm (12") minimum.
- 2. Two samples of each color or finish selected, 76mm (3") x 102mm (4") minimum.

C. Shop Drawings

- 1. Submit shop drawings showing project layout and elevations; fastening and anchoring methods; detail and location of joints, sealants, and gaskets, including joints necessary to accommodate thermal movement; trim; flashing; and accessories.

- D. Affidavit certifying material meets requirements specified.
- E. Two copies of manufacturer's literature for panel material.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect finish and edges in accordance with panel manufacturer's recommendations.
- B. Store material in accordance with panel manufacturer's recommendations.

PART 2 – PRODUCTS

2.01 PANELS

A. Manufacturers

- 1. Alucobond: www.alucobondusa.com
- 2. Bamco, Inc.: www.bamcoinc.org
- 3. High Standard, Inc.: www.hsipanel.com

B. Composite Panels

- 1. Basis of Design Product: ALUCOBOND material manufactured by Alcan Composites USA, Inc. 208 West 5th Street, Benton, KY 42025 (800-626-3365 or 270-527-4200)
- 2. Items of the same function and performance, which have received prior approval from the architect, shall be allowed for this project. Approval shall be based on documentation submitted showing the adequacy of the material.

C. Thickness: 4mm (0.157")

D. Product Performance

- 1. Bond Integrity When tested for bond integrity, in accordance with ASTM D1781 (simulating resistance to panel delamination), there shall be no adhesive failure of the bond a) between the core and the skin nor b) cohesive failure of the core itself below the following values:
- 2. Peel Strength:
 - a. 115 N mm/mm (22.5 in lb/in) as manufactured
 - b. 115 N mm/mm (22.5 in lb/in) after 21 days soaking in water at 70°F
- 3. Fire Performance
 - a. ASTM E 84 Flame Spread Index must be less than 25, Smoke Developed Index must be less than 450.
 - b. ASTM D 1929 A self ignition temperature of 650°F or greater
 - c. ASTM D-635 Requires a CC1 classification

E. Finishes

- 1. Coil coated KYNAR® 500 or HYLAR® 5000 based Polyvinylidene Fluoride (PVDF)
 - a. Color:
 - 1) Standard color as selected by the owner / architect / engineer from manufacturer's standard color palette.
 - b. Coating Thickness:
 - 1) Colors: 1.0 mil (±0.2 mil).
 - c. Hardness: ASTM D-3363; HB minimum using Eagle Turquoise Pencil.

- d. Impact:
 - 1) Test method: ASTM D-2794; Gardner Variable Impact Tester with 5/8" mandrel.
 - 2) Coating shall withstand reverse impact of 1.5"/pounds per mil substrate thickness.
 - 3) Coating shall adhere tightly to metal when subjected to #600 Scotch Tape pick-off test. Slight minute cracking permissible. No removal of film to substrate.
- e. Adhesion:
 - 1) Test Method: ASTM D-3359.
 - 2) Coating shall not pick off when subjected to an 11" x 11" x 1/16" grid and taped with #600 Scotch Tape.
- f. Humidity Resistance
 - 1) Test Method: ASTM D-2247.
 - 2) No formation of blisters when subject to condensing water fog at 100% relative humidity and 100°F for 4000 hours.
- g. Salt Spray Resistance:
 - 1) Test Method: ASTM B-117; Expose coating system to 4000 hours, using 5% NaCl solution.
 - 2) Corrosion creepage from scribe line: 1/16" max.
 - 3) Minimum blister rating of 8 within the test specimen field.
- h. Weather Exposure
 - 1) Outdoor:
 - a. Ten-year exposure at 45° angle facing south Florida exposure.
 - b. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.
 - c. Maximum chalk rating of 8 in accordance with ASTM D-4214.
 - d. No checking, crazing, adhesion loss.
- i. Chemical Resistance:
 - 1) ASTM D-1308 utilizing 10% Muriatic Acid for an exposure time of 15 minutes. No loss of film adhesion or visual change when viewed by the unaided eye.
 - 2) ASTM D-1308 utilizing 20% Sulfuric Acid for an exposure time of 18 hours. No loss of film adhesion or visual change when viewed by the unaided eye.
 - 3) AAMA 2605 utilizing 70% reagent grade Nitric Acid vapor for an exposure time of 30 minutes. Maximum color change of 5 Delta E units as calculated in accordance with ASTM D-2244.

1.02 PANEL FABRICATION

- A. Composition: two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process with no glues or adhesives between dissimilar materials. The core material shall be free of voids and/or air spaces and not contain foamed insulation material. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.
- B. Aluminum Face Sheets:
 - Thickness: 0.50mm (0.0197") (nominal)
 - Alloy: AA3000 Series (Painted material)
- C. Panel Weight:
 - 1. 4mm (0.157"): 1.12 lbs./ft²
- D. Tolerances
 - 1. Panel Bow: Maximum 0.8% of any 1828mm (72") panel dimension.

2. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
3. Panel lines, breaks, and angles shall be sharp, true, and surfaces free from warp and buckle.
4. Maximum deviation from panel flatness shall be 1/8" in 5'0" on panel in any direction for assembled units. (Non-accumulative - No Oil Canning)

E. System Characteristics

1. Plans, elevations, details, characteristics, and other requirements indicated are based upon standards by one manufacturer. It is intended that other manufacturers, receiving prior approval, may be acceptable, provided their details and characteristics comply with size and profile requirements, and material/performance standards.
2. System must not generally have any visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
3. System shall comply with the applicable provisions of the "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA and ANSI/AAMA 302.9 requirements for aluminum windows.
4. Fabricate panel system to dimension, size, and profile indicated on the drawings based on a design temperature of 70°F.
5. Fabricate panel system so that no restraints can be placed on the panel, which might result in compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature change and at all times remain air and water tight.
6. The finish side of the panel shall have a removable plastic film applied prior to fabrication, which shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.

F. System Type

Pick one of the following

1. Rout and Return Wet:
 - a. System must provide a wet seal (caulked) reveal joint as detailed on drawings. The sealant type shall be as specified in Section 07900 and with foamed type backer rod as indicated on architectural drawings.

G. System Performance

1. Composite panels shall be capable of withstanding building movements and weather exposures based on the following test standards required by the Architect and/or the local building code.
2. Wind Load:
 - a. If system tests are not available, mock-ups shall be constructed and tests performed under the direction of an independent third party laboratory, which show compliance to the following minimum standards:
 - b. Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 20 pounds per square foot (psf) and 30 psf on parapet and corner panels. Wind load testing shall be conducted in accordance with ASTM E330 to obtain the following results.
 - c. Normal to the plane of the wall between supports, deflection of the secured perimeter-framing members shall not exceed L/175 or 3/4", whichever is less.
 - d. Normal to the plane of the wall, the maximum panel deflection shall not exceed L/60 of the full span.

- e. Maximum anchor deflection shall not exceed 1/16".
- f. At 1-1/2 times design pressure, permanent deflections of framing members shall not exceed L/100 of span length and components shall not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed 1/16".
- 3. Air/Water System Test
 - a. If system tests are not available, mock-ups shall be constructed and tests performed under the direction of an independent third party laboratory, which show compliance to the following minimum standards:
 - b. Air Infiltration - When tested in accordance with ASTM E283, air infiltration at 1.57 psf must not exceed 0.06 cfm/ft² of wall area.
- 4. Water Infiltration
 - a. Water infiltration is defined as uncontrolled water leakage through the exterior face of the assembly.
 - b. Systems not using a construction sealant at the panel joints (i.e. Rout and Return Dry and Rear Ventilated Systems) shall be designed to drain any water leakage occurring at the joints.
 - c. No water infiltration shall occur in any system under a differential static pressure of 6.24 psf after 15 minutes of exposure in accordance with ASTM E331.
 - d. Pressure Equalized Rain Screen Systems shall comply with AAMA 508-05 Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems

2.03 ACCESSORIES

- A. Extrusions, formed members, sheet, and plate shall conform with ASTM B209 and the recommendations of the manufacturer.
- B. Panel stiffeners, if required, shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
- C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.
- D. Fabricate flashing materials from 0.030" minimum thickness aluminum sheet painted to match the adjacent curtain wall / panel system where exposed. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Surfaces to receive panels shall be even, smooth, sound, clean, dry and free from defects detrimental to work. Notify contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.
- B. Surfaces to receive panels shall be structurally sound as determined by a registered Architect/Engineer.

3.02 INSTALLATION

- A. Erect panels plumb, level, and true.
- B. Attachment system shall allow for the free and noiseless vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -20°F to +180°F. Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement will not be permitted.
- C. Fabrication, assembly, and erection procedure shall account for the ambient temperature at the time of the respective operation.
- D. Panels shall be erected in accordance with an approved set of shop drawings.
- E. Anchor panels securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary thermal movement and structural support.
- F. Conform to panel fabricator's instructions for installation of concealed fasteners.
- G. Do not install component parts that are observed to be defective, including warped, bowed, dented, abraded, and broken members.
- H. Do not cut, trim, weld, or braze component parts during erection in a manner which would damage the finish, decrease strength, or result in visual imperfection or a failure in performance. Return component parts which require alteration to shop for refabrication, if possible, or for replacement with new parts.
- I. Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

3.03 ADJUSTING AND CLEANING

- A. Remove and replace panels damaged beyond repair as a direct result of the panel installation. After installation, panel repair and replacement shall become the responsibility of the General Contractor.
- B. Repair panels with minor damage.
- C. Remove masking (if used) as soon as possible after installation. Masking intentionally left in place after panel installation on an elevation, shall become the responsibility of the General Contractor.
- D. Any additional protection, after installation, shall be the responsibility of the General Contractor.
- E. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- F. Final cleaning shall not be part of the work of this section.

END OF SECTION

SECTION 07530

ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Elastomeric roofing membrane, adhered conventional application.
- B. Insulation, flat and tapered.
- C. Vapor retarder.
- D. Flashings.

1.02 RELATED REQUIREMENTS

- A. Section 06100 - Rough Carpentry: Wood nailers and curbs.
- B. Section 07620 - Sheet Metal Flashing and Trim: Counterflashings, reglets,.

1.03 REFERENCE STANDARDS

- A. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2004.
- B. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2007.
- C. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2007).
- D. ASTM D 4637 - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2004.
- E. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; National Roofing Contractors Association; Fifth Edition, with interim updates.
- F. UL (RMSD) - Roofing Materials and Systems Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of associated counterflashings installed under other sections.
- B. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.
- C. Shop Drawings: Indicate joint or termination detail conditions and conditions of interface with other materials.
- D. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.
- E. Warranty: Submit manufacturer warranty and ensure forms have been completed in VCCS's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
 - 1. Maintain one copy on site.
- B. Applicator Qualifications: Company specializing in performing the work of this section approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.

1.08 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 90 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

1.09 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide 15 year manufacturer's material and labor warranty to cover failure to prevent penetration of water for the portions of work completed under this contract.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. EPDM Membrane Materials:
 - 1. Carlisle SynTec: www.carlisle-syntec.com.
 - 2. Firestone Building Products Co: www.firestonebpc.com.
 - 3. GenFlex Roofing Systems: www.genflex.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.
- B. Insulation:
 - 1. Atlas Roofing Corporation: www.atlasroofing.com.
 - 2. GAF Materials Corporation: www.gaf.com.
 - 3. Dow Chemical Co: www.dow.com.
 - 4. Owens Corning Corp: www.owenscorning.com.
 - 5. Substitutions: See Section 01600 - Product Requirements.

2.02 ROOFING - UNBALLASTED APPLICATIONS

- A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over vapor retarder and insulation.
- B. Roofing Assembly Requirements:
 - 1. Roof Covering External Fire-Resistance Classification: UL Class A.
- C. Acceptable Insulation Types - Tapered Application: Any of the types specified.
 - 1. Tapered extruded polystyrene board. Match thickness and slope of existing roof insulation.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: Ethylene-propylene-diene-terpolymer (EPDM); externally reinforced with fabric; complying with minimum properties of ASTM D 4637.
 - 1. Thickness: 0.045 inch.
 - 2. Color: Black.
 - 3. Tear Strength: 150 lbf/in, measured in accordance with ASTM D 624.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Vapor Retarder: Reinforced Kraft paper laminate complying with requirements of fire rating classification; compatible with roofing and insulation materials.
 - 1. Fire-retardant adhesive.
- D. Flexible Flashing Material: Same material as membrane; conforming to the following:
 - 1. Tensile Strength: 1,200 psi.
 - 2. Elasticity: 50 percent with full recovery without set.
 - 3. Color: Black.

2.04 INSULATION

- A. Extruded Polystyrene Board Insulation: ASTM C 578, Type X; Extruded expanded polystyrene board with natural skin surfaces; with the following characteristics:
 - 1. Board Size: 48 x 96 inch.
 - 2. Board Thickness: 2 inches.
 - 3. Tapered Board: Slope as indicated; minimum thickness 1/2 in; fabricate of fewest layers possible.
 - 4. Thermal Conductivity (k factor) at 25 degrees F: 0.18 as determined by ASTM C 177.
 - 5. Compressive Resistance: 25 psi.

2.05 ACCESSORIES

- A. Cant Strips: Wood; pressure preservative treated.
- B. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
- C. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
 - 1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- D. Membrane Adhesive: As recommended by membrane manufacturer.
- E. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- F. Insulation Adhesive: As recommended by insulation manufacturer.
- G. Sealants: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.

- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 VAPOR RETARDER AND INSULATION - UNDER MEMBRANE

- A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
 - 1. Extend vapor retarder under cant strips and blocking to deck edge.
 - 2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.
- B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.
- C. Attachment of Insulation:
 - 1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions.
- D. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
- E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.
- F. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- H. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.
- I. Do not apply more insulation than can be covered with membrane in same day.

3.03 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at rate of manufacturer's recommended gal/square. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
 - 3. Secure flashing to nailing strips at 4 inches on center.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Coordinate installation of roof drains and sumps and related flashings.
- H. Coordinate installation of associated counterflashings installed under other sections.

3.04 FIELD QUALITY CONTROL

- A. See Section 01400 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Require site attendance of roofing and insulation material manufacturers daily during installation

of the Work.

3.05 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.

3.06 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings.

1.02 RELATED REQUIREMENTS

- A. Section 07900 - Joint Sealers.
- B. Section 15000: Roof curbs for mechanical equipment.

1.03 REFERENCE STANDARDS

- A. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.
- B. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2006.
- C. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.

2.02 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Underlayment: ASTM D 226, organic roofing felt, Type I ("No. 15").
- C. Primer: Zinc chromate type.
- D. Protective Backing Paint: Zinc molybdate alkyd.
- E. Sealant: Type 2 specified in Section 07900.
- F. Plastic Cement: ASTM D 4586, Type I.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

3.04 SCHEDULE

- A. Counterflashings at Roofing Terminations (over roofing base flashings):
- B. Counterflashings at Curb-Mounted Roof Items:

END OF SECTION

SECTION 07840

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.

1.02 RELATED REQUIREMENTS

- A. Section 01700 - Execution Requirements: Cutting and patching.
- B. Section 09260 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 REFERENCE STANDARDS

- A. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2006.
- B. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.
- C. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in the current-year classification or certification books of UL will be considered as constituting an acceptable test report.
- B. Installer Qualifications: Company specializing in performing the work of this section.

1.06 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 that has F Rating equal to fire rating of penetrated assembly and T Rating Equal to F Rating and that meets all other specified requirements.

2.02 MATERIALS

- A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authority having jurisdiction.
- C. Install labelling required by code.

3.04 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.

1.02 RELATED REQUIREMENTS

- A. Section 07840 - Firestopping: Firestopping sealants.
- B. Section 08630 - Metal-Framed Skylights: Structural and weatherseal sealants and accessories.
- C. Section 08800 - Glazing: Glazing sealants and accessories.

1.03 REFERENCE STANDARDS

- A. ASTM C 834 - Standard Specification for Latex Sealants; 2005.
- B. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications; 2008.
- C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2005.
- D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2009.
- E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with other sections referencing this section.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, and color availability.

1.06 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this section approved by manufacturer.

1.07 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Silicone Sealants:

1. Bostik Inc: www.bostik-us.com.
 2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
 3. Pecora Corporation: www.pecora.com.
 4. BASF Construction Chemicals-Building Systems: www.chemrex.com.
 5. Substitutions: See Section 01600 - Product Requirements.
- B. Polyurethane Sealants:
1. Bostik Inc: www.bostik-us.com.
 2. Pecora Corporation: www.pecora.com.
 3. BASF Construction Chemicals-Building Systems: www.chemrex.com.
 4. Substitutions: See Section 01600 - Product Requirements.
- C. Acrylic Sealants:
1. Tremco Global Sealants: www.tremcosealants.com.
 2. Substitutions: See Section 01600 - Product Requirements.
- D. Butyl Sealants:
1. Bostik Inc: www.bostik-us.com.
 2. Pecora Corporation: www.pecora.com.
 3. Substitutions: See Section 01600 - Product Requirements.
- E. Acrylic Emulsion Latex Sealants:
1. Bostik Inc: www.bostik-us.com.
 2. Pecora Corporation: www.pecora.com.
 3. BASF Construction Chemicals-Building Systems: www.chemrex.com.
 4. Substitutions: See Section 01600 - Product Requirements.

2.02 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
1. Color: Match adjacent finished surfaces.
 2. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- C. Type 2 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
1. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
- D. Type 3 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
1. Color: Match adjacent finished surfaces.
 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- E. Type 4 - Bathtub/Tile Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.
1. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.

- F. Type 5 - Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
 - 1. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
- G. Type 6 - Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.
 - 1. Color: Gray.
 - 2. Applications: Use for:
 - a. Joints in sidewalks and vehicular paving.
- H. Type 7 - Silicone Sealant: ASTM C 920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
 - 1. Color: Clear.
 - 2. Applications: Use for:
 - a. Joints between countertops/backsplashes and wall surfaces.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Perform acoustical sealant application work in accordance with ASTM C 919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave.

3.04 CLEANING

A. Clean adjacent soiled surfaces.

3.05 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Fire-rated steel doors and frames.
- D. Thermally insulated steel doors.

1.02 RELATED REQUIREMENTS

- A. Section 08710 - Door Hardware.
- B. Section 08800 - Glazing: Glass for doors and borrowed lites.
- C. Section 09900 - Paints and Coatings: Field painting.

1.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2003.
- B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.
- C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2004).
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.
- E. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.
- F. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.
- G. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.
- H. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- I. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 1998.
- J. UL Fire Resistance Directory

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Doors and Frames:
 - 1. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
 - 2. Windsor Republic Doors: www.republicdoor.com.
 - 3. Steelcraft: www.steelcraft.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
 - 1. Accessibility: Comply with ANSI/ICC A117.1.
 - 2. Door Top Closures: Flush with top of faces and edges.
 - 3. Door Edge Profile: Beveled on both edges.
 - 4. Door Texture: Smooth faces.
 - 5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
 - 6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 - 7. Galvanizing for Units in Wet Areas: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
 - 8. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

- A. Exterior Doors:
 - 1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
 - 2. Core: Polystyrene foam.
 - 3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
 - 4. Weatherstripping: Separate, see Section 08710.

2.04 STEEL FRAMES

- A. General:
 - 1. Comply with the requirements of grade specified for corresponding door.
 - a. ANSI A250.8 Level 3 Doors: 14 gage frames.
 - b. Frames for Wood Doors: Comply with frame requirements specified in ANSI A250.8 for Level 1, 18 gage
 - 2. Finish: Factory primed, for field finishing.
 - 3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
 - 4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- B. Exterior Door Frames: Fully welded.

1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
 2. Weatherstripping: Separate, see Section 08710.
- C. Interior Door Frames, Non-Fire-Rated: Fully welded type.
- D. Interior Door Frames, Fire-Rated: Fully welded type. Tested to ratings indicated on drawings in accordance UL 10C for UL Category A positive pressure fire doors.
1. Fire Rating: Same as door, labeled.
 2. Hardware preparation: Modifications made to Fire-Rated frames for electric and mortised hardware shall be made by the frame manufacturer. Field modifications shall not be permitted per NFPA 80-1999.

2.05 ACCESSORY MATERIALS

- A. Glazing: As specified in Section 08800, factory installed.
- B. Astragals for Double Doors: Specified in Section 08710.
1. Fire-Rated Doors: Steel, shape as required to accomplish fire rating.
- C. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.
- D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80-1999, manufacturer's installation instructions, and the listing requirements.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Coordinate installation of hardware.
- F. Coordinate installation of glazing.

- G. Coordinate installation of electrical connections to electrical hardware items.
- H. Touch up damaged factory finishes.
- I. For fire rated door frames, do not paint over rating labels.

3.04 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08211

FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; flush and flush glazed configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08110 - Steel Doors and Frames.
- B. Section 08710 - Door Hardware.
- C. Section 08800 - Glazing.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- C. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.
- D. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2003.
- E. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- F. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; 1998.
- G. UL Fire Resistance Directory; Underwriters Laboratories, Inc.; current edition.
- H. WDMA I.S.1-A - Architectural Wood Flush Doors; Window and Door Manufacturers Association; 2004.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Specimen warranty.
- D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.
- E. Samples: Submit three samples of door veneer, 8 by 12 inch in size illustrating wood grain, stain color, and sheen.
- F. Manufacturer's Installation Instructions: Indicate special installation instructions.
- G. Warranty, executed in VCCS's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

- B. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

- A. See Section 01780 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
 - 1. Eggers Industries: www.eggersindustries.com.
 - 2. Haley Brothers: www.haleybros.com.
 - 3. Marshfield DoorSystems, Inc: www.marshfelddoors.com.
 - 4. Algoma Doors: www.algomahardwoods.com
 - 5. Substitutions: See Section 01600 - Product Requirements.

2.02 DOORS AND PANELS

- A. All Doors: See drawings for locations and additional requirements.
 - 1. Quality Level: Custom Grade, Extra Heavy Duty performance, in accordance with WDMA I.S.1-A.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
 - 1. Provide solid core doors at all locations.
 - 2. Fire Rated Doors: UL Category A positive pressure fire doors. Tested to ratings indicated on drawings in accordance with NFPA 252, UL 10B, or UBC Standard 7-2-94 ("neutral pressure"); UL or WH (ITS) labeled without any visible seals when door is open.
 - a. Hardware preparation: Modifications made to fire-rated doors for electric and mortised hardware shall be made by the door manufacturer. Field modifications shall not be permitted per NFPA 80-1999.
 - 3. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated above.
- B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Wood Veneer Facing for Transparent Finish: Maple, veneer grade as specified by quality standard, plain sliced, book veneer match, running assembly match; unless otherwise indicated.

1. Vertical and Horizontal Edges: Same species as face veneer.
- B. Facing Adhesive: Type I - waterproof.

2.05 ACCESSORIES

- A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
- B. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

2.06 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- D. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
 1. Exception: Doors to be field finished.
- E. Provide edge clearances in accordance with AWI Quality Standards Illustrated Section 1700.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

- A. Factory finish doors in accordance with approved sample.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 1. Install fire-rated doors in accordance with NFPA 80-1999, manufacturer's installation instructions, and listing requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for maximum diagonal distortion.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE - See Drawings

END OF SECTION

SECTION 08310

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Access door and frame units, fire-rated and non-fire-rated, in wall, and ceiling locations.

1.02 REFERENCE STANDARDS

- A. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of all access door units.
- D. Project Record Documents: Record actual locations of all access units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Access Doors:
 - 1. Acudor Products Inc: www.acudor.com.
 - 2. Karp Associates, Inc: www.karpinc.com.
 - 3. Milcor Inc: www.milcorinc.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 ACCESS DOORS AND PANELS

- A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
- B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.
 - 1. Provide products listed and labeled by UL as suitable for the purpose specified and indicated.

2.03 WALL AND CEILING UNITS

- A. Door and Frame Units: Formed steel.
 - 1. Frames and flanges: 0.058 inch steel.
 - 2. Door panels: 0.070 inch single thickness steel sheet.
 - 3. Sizes:
 - a. Walls: 12 x 12 inches.
 - b. Ceilings: 12 x 12 inches.
 - 4. Hardware:
 - a. Hinge: Concealed constant force closure spring type.
 - b. Lock: Screw driver slot for quarter turn cam lock.
 - 5. Galvanized, hot dipped finish.
 - 6. Prime coat with baked on primer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08410

METAL-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 07900 - Joint Sealers: Perimeter sealant and back-up materials.
- B. Section 08710 - Door Hardware: Hardware items other than specified in this section.
- C. Section 08800 - Glazing: Glass and glazing accessories.
- D. Section 12492 - Horizontal Louver Blinds: Attachments to framing members.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2004.
- B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2003 (part of AAMA 501).
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 1998.
- D. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2005.
- E. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2008.
- F. ASTM B 221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2007.
- G. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.
- H. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002.
- I. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

- D. Design Data: Provide framing member structural and physical characteristics, dimensional limitations.
- E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in VCCS's name and registered with manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.06 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.07 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: See below under description of products.
- B. Kawneer North America; Product 451/451T. www.kawneer.com
- C. Other Acceptable Manufacturers:
 - 1. YKK AP America Inc: www.ykkap.com.
 - 2. United States Aluminum Corp: www.usalum.com.
 - 3. Vistawall Architectural Products: www.vistawall.com.

2.02 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Centered (front to back).
 - 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
 - 3. Water Leakage Test Pressure Differential: 10 lbf/sq ft.
 - 4. Air Infiltration Test Pressure Differential: 1.57 psf.
 - 5. Finish: Class I natural anodized.
- B. Performance Requirements:
 - 1. Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.

- a. Design Wind Loads: Comply with requirements of 2006 code.
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
- 2. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
- 3. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure across assembly in accordance with ASTM E 283.
- 4. Water Leakage: None, when measured in accordance with ASTM E 331 at specified pressure differential.
- 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
- 6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Framing members for interior applications need not be thermally broken.
 - 2. Glazing stops: Flush.
- B. Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches.
 - 2. Top Rail: 4 inches wide.
 - 3. Vertical Stiles: 4-1/2 inches wide.
 - 4. Bottom Rail: 12 inches wide.
 - 5. Glazing Stops: Square.
 - 6. Finish: Same as storefront.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B 221 (ASTM B 221M).
- B. Fasteners: Stainless steel.
- C. Concealed Flashings: 0.018 inch thick aluminum.
- D. Glass: As specified in Section 08800.
- E. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- F. Glazing Accessories: As specified in Section 08800.

2.05 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating or AAMA 612 clear anodic coating with electrolytically deposited organic seal; not less than 0.7 mils thick.

2.06 HARDWARE

- A. Door Hardware: As specified in Section 08710.
- B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

2.07 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
- E. Arrange fasteners and attachments to conceal from view.
- F. Reinforce components internally for door hardware.
- G. Reinforce framing members for imposed loads.
- H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
 - 1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Set thresholds in bed of mastic and secure.
- K. Install glass in accordance with Section 08800, using glazing method required to achieve performance criteria.
- L. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

- A. Test installed storefront for water leakage in accordance with AAMA 501.2.

3.05 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.06 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08710

DOOR HARDWARE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Work under this section comprises of furnishing and installing commercial door hardware needed for a complete and operational system for following:
 - a. Swinging doors
2. Electrified door hardware

B. Related Sections:

1. Section 081113 Hollow Metal Doors and Frames
2. Section 081416 Flush Wood Doors
3. Section 084113 Aluminum-Framed Entrances and Storefronts

1.2 REFERENCES

A. Publications listed herein are part of this specification to extent referenced.

B. American National Standards Institute:

1. ANSI A156 Series
2. ANSI A115W Wood Door Hardware Standards; Hardware Preparation
3. ANSI A115 Specifications for Steel Door and Frame Preparation for Hardware
4. ANSI A117.1 Accessible and Usable Buildings and Facilities
5. ANSI A250.6 Hardware on Steel Doors (Reinforcement - Applications)

C. Americans with Disabilities Act Accessibility Guidelines (ADAAG)

D. Door and Hardware Institute:

1. DHI Publication - Abbreviations and Symbols
2. DHI Publication - Basic Architectural Hardware
3. DHI Publication - Hardware for Labeled Fire Doors (with supplements)
4. DHI Publication - Hardware Reinforcements on Steel Doors and Frames
5. DHI Publication - Installation Guide for Doors and Hardware
6. DHI Publication - WDHS-1 Template Book Criteria for Wood Doors
7. DHI Publication - WDHS-3 Recommended Hardware Locations for Wood Flush Doors
8. DHI Publication - For Processing Hardware Schedules and Templates

E. National Fire Protection Association:

1. NFPA 70 National Electrical Code
2. NFPA 80 Standard for Fire Doors and Windows

F. Steel Door Institute:

1. SDI-109 Hardware for Standard Steel Doors and Frames

G. Underwriters Laboratories, Inc.

1. UL Standard 10C Positive Pressure Fire Tests of Door Assemblies
2. UL Building Materials Directory

H. Virginia Uniform Statewide Building Code

1.3 SUBMITTALS

A. Submittal Sequence:

1. Submit final Door Hardware Schedule at earliest possible date, particularly where approval of Door Hardware Schedule must precede fabrication of other work that is critical in Project construction schedule.
2. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to coordinated review of Door Hardware Schedule.

B. Product Data:

1. Submit manufacturer's technical product fact sheets describing each item of hardware to be provided including material descriptions, dimensions of individual components and profiles, and finishes.

C. Door Hardware Schedule:

1. Submit door hardware schedule prepared by or under supervision of a DHI certified Architectural Hardware Consultant (AHC) or Certified Door Consultant (CDC) detailing fabrication and assembly of door hardware, as well as procedures and diagrams.
2. Coordinate Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
3. Format:
 - a. Comply with scheduling sequence and vertical form as described in DHI's *Sequence and Format for the Hardware Schedule*.
 - b. Horizontal hardware schedules are not acceptable.
 - c. Submit 4 copies of hardware schedule.
4. Organization:
 - a. Organize door hardware schedule into hardware sets indicating complete designations of every item needed for each door or opening.
 - b. Organize door hardware sets in same order as in Door Hardware Schedule contained in Part 3 of this specification.
 - c. For doors of different sizes or where hinges, locks, or closers are different, a separate heading shall be used. No labeled openings shall be combined with non-labeled openings.
5. Content:
 - a. Type, style, function, size, label, hand, and finish for each door hardware item
 - b. Name and manufacturer of each item
 - c. Fastenings and other pertinent information
 - d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule
 - e. Explanation of abbreviations, symbols, and codes contained in schedule
 - f. Mounting locations for door hardware
 - g. Door and frame sizes and materials

D. Shop Drawings:

1. Provide a copy with each hardware schedule submitted.
 - a. Electrical components shall be listed by opening in hardware submittals.

2. Submit details of interface between electrified door hardware and following:
 - a. Fire alarm system
 - b. Access control system
 - c. Security system
 - d. Building control system
3. Provide description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems; include description of component functions that occur in following situations:
 - a. Authorized person wants to enter
 - b. Authorized person wants to exit
 - c. Unauthorized person wants to enter
 - d. Unauthorized person wants to exit
4. Provide elevation drawings of electronic hardware and systems identifying locations of system components with respect to their placement in door opening.
 - a. Indicate mounting heights and locations of electronic components listed by opening in hardware submittals.
5. Wiring Diagrams:
 - a. Submit detail wiring for power, signal, and control systems for all openings needing electrified hardware, except openings where only magnetic hold-opens are specified. Differentiate between manufacturer-installed and field-installed wiring. Include following:
 - (1) System schematic
 - (2) Point-to-point wiring diagram
 - (3) Riser diagram
 - (4) Elevation of each door

E. Samples:

1. Submit samples of door hardware items if requested by Architect. Accepted samples may be incorporated into Work.

F. Quality Assurance Submittals:

1. Test Reports:
 - a. Provide product test reports based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, indicating current products comply with requirements.
2. Certificates:
 - a. Submit Product Certificates signed by manufacturers of electrified door hardware certifying that electronic hardware and systems being furnished comply with specified requirements.
 - b. Submit a statement from manufacturer certifying that door hardware is approved for use on types and sizes of labeled fire doors and complies with listed fire door assemblies.
3. Manufacturer's Instructions:
 - a. Submit instructions for installation and maintenance of operating parts and finish.
 - b. Furnish templates and schedules needed for fabrication of hollow metal doors and frames, wood doors and frames, and other items related to hardware.
 - c. Submission for templates and template list shall follow procedures established by DHI publication *For Processing Hardware Schedules and Templates*.

G. Closeout Submittals:

1. Operation and Maintenance:
 - a. Provide operation and maintenance data for electrically operated and non-electrical hardware consisting of technical information as follows:

- (1) Maintenance instructions for each item of hardware
 - (2) Catalog pages for each product
 - (3) Parts list for each product
 - (4) Copy of final hardware schedule
 - (5) Copy of final keying schedule
- b. Provide complete operational descriptions of electronic components listed by opening in hardware submittals.
 - (1) Operational descriptions shall detail how each electronic component functions within opening incorporating conditions of ingress and egress.
 - (2) Provide complete point-to-point wiring diagrams for electronic components listed by opening in hardware submittals.
- c. Include a copy of operational and maintenance descriptions in Operation and Maintenance Data Manual.
- 2. Warranties:
 - a. Submit Special warranties specified in this Section.
- 3. Keying Schedule:
 - a. Prepare and submit a keying schedule using keyset symbols referenced in DHI manual *Keying Systems and Nomenclature*. Include schematic keying diagram and index each key set to unique door designations.
 - (1) Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - b. Provide one complete bitting list of key cuts.
 - c. Keying schedule shall be prepared by or under supervision of supplier, detailing Owner's final keying instructions for locks.
 - d. Submit 4 copies of keying schedule.
- 4. Deliver keys to Owner by registered mail or overnight package service.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Door Hardware Supplier:
 - a. Door hardware supplier shall have warehousing facilities in Project's vicinity and shall employ a qualified Certified Architectural Hardware Consultant (AHC) available during course of Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 - b. Electrified Door Hardware:
 - (1) Supplier shall be an experienced door hardware supplier who has completed projects with electrified door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.
 - (2) Supplier shall prepare data for electrified door hardware, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- 2. Architectural Hardware Consultant:
 - a. Architectural Hardware Consultant shall be a person who is currently certified by Door and Hardware Institute as an Architectural Hardware Consultant (AHC) and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
 - b. Architectural Hardware Consultant shall be experienced in providing consulting services for electrified door hardware installations.
- 3. Installer:
 - a. Door hardware shall be installed by an experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

4. Single Source Responsibility:
 - a. Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
 - b. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
 - c. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, shall be acceptable.

B. Regulatory Requirements:

1. Hardware and installation shall comply with provisions and standards listed.
2. Virginia Uniform Statewide Building Code
3. Federal Accessibility Regulations:
 - a. Americans with Disabilities Act - ADA
 - b. Uniform Federal Accessibility Standards - UFAS
 - c. ANSI A117.1 Standard for Accessible and Usable Buildings and Facilities
 - d. Accessibility Guidelines for Buildings and Facilities (ADAAG)
4. National Fire Protection Association:
 - a. NFPA 80 Standard for Fire Doors and Windows
5. Underwriters Laboratories Inc.:
 - a. UL 10C Positive Pressure Fire Tests of Door Assemblies
6. ANSI/BHMA Standards
 - a. A115-W Series
 - b. A115 Series
 - c. A156 Series:
7. Door and Hardware Institute:
 - a. Abbreviations and Symbols
 - b. Basic Architectural Hardware
 - c. Hardware for Labeled Fire Doors (with supplements)
 - d. Hardware Reinforcements on Steel Doors and Frames
 - e. Installation Guide for Doors and Hardware
 - f. WDHS-1 Template Book Criteria for Wood Doors
 - g. WDHS-3 Recommended Hardware Locations for Wood Flush Doors

C. Certifications:

1. Hardware used in labeled fire or smoke rated openings shall bear identifying label or mark indicating listing by Underwriters Laboratories, Inc., ITS (Warnock Hersey International), or other nationally recognized organizations acceptable to authority having jurisdiction.
2. Provide door hardware for fire-rated door assemblies complying with NFPA 80, and VUSBC requirements.
3. Electrified door hardware shall be listed and labeled as defined in NFPA 70, Article 100.

D. Pre-Installation Meetings:

1. Conduct conference on-site to comply with requirements in Division 1 for Project Meetings.
2. Topics to be discussed at meeting shall include:
 - a. Review items such as proper installation sequence, adjustments, attachment, and location of door hardware.
 - b. Review methods and procedures related to electrified door hardware including but not limited to following:
 - (1) Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
 - (2) Review sequence of operation for each type of electrified door hardware.
 - (3) Review required testing, inspecting, and certifying procedures.

- c. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.

E. Keying Conference:

- 1. Conduct conference on-site to comply with requirements in Division 1 for Project Meetings. Participants shall be Owner's representative, Contractor, hardware supplier, and lock manufacturer's representative.
- 2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including but not limited to following:
 - a. Function of building, flow of traffic, purpose of each area, degree of security needed, and plans for future expansion
 - b. Preliminary key system schematic diagram
 - c. Requirements for key control system
 - d. Address for delivery of keys

F. Coordination:

- 1. Templates:
 - a. Obtain and distribute templates for doors, frames, and other work specified to be factory prepared for installing door hardware to parties involved.
 - b. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with specified requirements.
- 2. Electrical System Roughing-In:
 - a. Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, building control system.
 - b. Refer to work specified in Division 16 applicable to electrified hardware items including, but not limited to conduit, pull boxes, wiring, and final connections.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

- 1. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Site.
- 2. Tag each item or package separately with identification related to final Door Hardware Schedule, and include basic installation instructions with each item or package.

1.6 SPECIAL WARRANTY

- A. Provide written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include but are not limited to following:
 - 1. Structural failures including excessive deflection, cracking, or breakage
 - 2. Faulty operation of operators and door hardware
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering
- B. Warranty period shall be for not less than 3 years from Date of Substantial Completion unless otherwise indicated.
 - 1. Locks: 3 years
 - 2. Manual Closers: 10 years
 - 3. Exit Devices: 10 years

- C. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

1.7 MAINTENANCE

A. Maintenance Service:

1. Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of door hardware installer.
 - a. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as needed for proper door hardware operation.
 - b. Provide parts and supplies as used in manufacture and installation of original products.
2. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.1 MATERIALS

A. General Requirements:

1. Hardware shall be of best grade, entirely free of imperfections in manufacture and finish, and shall satisfactorily perform various functions needed.
2. Furnish necessary screws, bolts or others fastenings of suitable size and type to anchor hardware in position and match hardware as to material and finish. Provide Phillips flat-head screws except as otherwise indicated.
3. Do not use through-bolts for installations where bolt head or nut opposite face is exposed in other work. Use of sex bolts shall not be allowed.
4. Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as indicated. Items of hardware not definitely specified, but needed for satisfactory installation of hardware shall be provided. Such items shall be of type and quality suitable for service needed and comparable to adjacent hardware.
5. Finishes shall comply with ANSI A156.18/ BHMA 1301. Finish designations cross references shall be as follows:

BHMA Code	Description	Nearest US Equiv.	BHMA Category	Basis Metal
626	Satin chromium plated	US26D	A	Brass; Bronze
628	Satin aluminum, clear anodized	US27	A	Aluminum
630	Satin stainless steel	US32D	A	Stainless Steel
652	Satin chromium plated	US26D	E	Steel
689	Aluminum painted	US28	E	Any

B. Substitutions:

1. Manufacturers and model numbers are to establish the standard of quality and design. No other products will be accepted.

2.2 HINGES

A. Butt Hinges: ANSI/ BHMA A156.1

1. Provide full mortise, template, 5-knuckle, button tip hinges with non-rising loose pins and ball type bearings.
2. Out-swinging exterior doors shall be furnished with solid bronze or stainless steel, hinges with non-removable pins or security studs.
3. Interior doors with locksets shall be furnished with non-removable pins hinges.
4. Hinges shall be furnished in following quantities:
 - a. Doors up to 90" in height: 3 hinges
 - b. Doors over 90" in height: Add 1 hinge for every additional 30"
5. Furnish hinge sizes not less than as follows:
 - a. For 1 3/4" Thick Doors: Standard weight
 - (1) Doors up to 3'-6" wide: 4 1/2 x 4 1/2 x 0.134 gauge
6. Furnish hinges of sufficient throw where needed to clear trim or permit doors to swing 180 degrees.
7. Finishes:
 - a. Exterior Doors: BHMA #630 (US32D)
 - b. Interior Doors: BHMA #652 (US26D)
8. Acceptable Manufacturers:

	<u>Steel</u>	<u>Stainless Steel</u>
a. Bommer:	BB5000	BB5002
b. McKinney:	TB2714	TB2314
c. H. B. Ives:	5BB1	5BB1

B. Pin and Barrel Continuous Hinges: ANSI/ BHMA A156.26 Grade 1

1. Provide full mortise, non-handed, full height hinges with symmetrically templated hole pattern made from 14 gauge, 304 stainless steel.
2. Each knuckle shall be approximately 2", including split nylon bearing at each separation.
3. Pin Diameters: 1/4"
4. External Barrel Diameter: 7/16"
5. Finish: BHMA #630 (US32D)
6. Acceptable Manufacturers:
 - a. Ives: 700
 - b. Markar: FM 300
 - c. Zero: 919 STST

C. Geared Continuous Hinges: ANSI/ BHMA A156.26 Grade 1

1. Provide full mortise, non-handed, full height hinges with interlocking cover and symmetrically templated hole pattern made from extruded aluminum.
2. Finish: BHMA #628 (US27)
3. Acceptable Manufacturers:
 - a. Ives: 112HD
 - b. Select: SL11HD
 - c. Zero: 910 DB AA

2.3 LOCKSETS AND LATCHSETS

A. General Requirements:

1. Shape of lever shall be easy to grasp with one hand and not require tight grasping, tight pinching, or twisting of wrist.
2. Locksets and latchsets shall not require more than 15 lbf to release latch. Locks shall not require use of a key, tool, or special knowledge for operation.

3. Provide manufacturer's standard wrought box strike for each latchset and lockset with curved lip extended to protect frame without catching clothing. Finish shall match hardware set.
4. Provide all doors with hi-security patented full sized interchangeable core cylinders.

B. Mortise Locksets and Latchsets:

1. Provide heavy duty mortise locksets and latchsets that comply to ANSI A156.13, Series 1000, Operational Grade 1 and Security Grade 1 with all standard trims.
2. Provide mortise locksets that comply with UL10C and UBC 7-2 positive pressure requirements.
3. Lock case shall be manufactured from fully wrapped, heavy 12 gauge steel to limit access to operating parts. Manufacturers utilizing an exposed edge case are not acceptable.
4. Lock components shall be manufactured from zinc dichromate plated steel. Manufacturers utilizing plastic parts, spacers, and/or bushings are not acceptable.
5. Locksets are to have a standard 2 3/4" backset with a full 3/4" throw latchbolt. Deadbolt shall be 1-3/4" total length with a full 1" throw, constructed of stainless steel with anti saw roller insert.
6. Latchbolts are to be 2-piece anti-friction, manufactured from stainless steel. Solid latchbolts and/or plastic anti friction devices are not acceptable.
7. Lever assembly (external) to be one-piece design attached by threaded bushing. Lever assembly (internal) shall be attached by screwless shank. Lever attachment by common tools (allen nuts and/or set screws) are not acceptable.
8. Lock trim shall be through-bolted to door to assure correct alignment a proper operation and positive interlock. Manufacturers utilizing a through the door spindle for attachment are not acceptable.
9. Hub blocking plate to be solid cast stainless steel. Manufacturers utilizing open hub designs are not acceptable.
10. Strikes to be non handed and bridged to ensure dead latching. Manufacturers utilizing fillers of any kind for dead latch engagement are not acceptable.
11. Cylinders shall be secured by a retainer.
12. Finish: BHMA #626 (US26D)
13. Acceptable Manufacturers:
 - a. Schlage: L9000 Series with 17A lever design
 - b. Falcon: M Series with Quantum lever design
 - c. Best Lock: 40H series with 14H lever design.

2.4 EXIT DEVICES

A. Exit Devices: ANSI/ BHMA A156.3, Grade 1

ALL EXIT DEVICES TO BE TOUCH BAR AS SPECIFIED.

1. Furnish roller strikes for all rim exit devices.
2. All mounting fasteners to be concealed. Devices to be non-handed or field reversible.
3. Furnish stainless steel latchbolt with 3/4" throw and security deadlatching for all rim and surface vertical rod exit devices.
4. Furnish center case with heavy wrought and sintered parts and stamped cold roll steel chassis with a thickness of .090"
5. Device cover, stainless steel, 0.048" thick or brass, 0.050" thick.
6. Furnish stainless steel or brass touch pad cover on all exit devices.
7. Mechanism housing, extruded aluminum with 0.080" thickness and extruded aluminum cover with 0.152" thickness.
8. The end cap to be cast or forged material and is not to overlap the mechanism case.
9. Have no exposed rivets or screws on back of device that would be visible through a glass light.

10. Doors greater than 3'0" (915mm) provide long bar exit devices, doors greater than 7'0" (2134mm) supply extension rods for required series.
11. 10 year manufacturer standard warranty
12. Escutcheons for all lever trim to be deep drawn stainless steel or brass with (4) thru-bolts anchoring trim assembly to exit device chassis.
13. Levers to be brass, cast or forged.
14. Lever return springs to be compression type.
15. Protect lever trim by a shear pin, which will withstand a rotational force of 35 ft.-lbs before shearing. The lever is not to separate from the escutcheon.
16. Trim escutcheon to be deep drawn stainless steel or brass.
17. Trim shall meet ANSI/BHMA 156.3 Trim Security Test.
18. Vertical rod devices to be UL, cUL labeled for fire door applications without the use of bottom rod assemblies. Where bottom rods are required for security applications, device shall be UL, cUL labeled for fire door applications.
19. Fire exit devices mounted on labeled wood doors to be thru-bolt mounted in compliance with door manufacturer's requirements. Where special blocking has been specified in wood door specification, do not thru-bolt exit devices.
20. Acceptable Manufacturers:
 - a. Falcon: 25 series
 - b. Von Duprin: 98 series
 - c. Sargent: GL-19-43-80 series

2.5 DOOR CLOSERS

A. General Requirements:

1. Closers shall be sealed and filled with all-weather fluid. Provide stable hydraulic fluid to withstand a temperature range of 120 degrees F to minus 30 degrees F.
2. Size closers in compliance with requirements for accessibility for handicapped and recommendations of manufacturer. Provide barrier free and delayed action features as needed. Comply with following maximum opening-force requirements:
 - a. Interior Hinged Doors: 5.0 lbs.
 - b. Exterior Hinged Doors: 8.5 lbs.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction

B. Surface Closers: ANSI/ BHMA A156.4, Grade 1

1. Surface mounted closers shall be full rack-and-pinion type closer with full complement bearings, single piece forged piston, chrome silicon steel spring, non-critical screw valves; back check, sweep and latch.
2. Furnish closers complete with rectangular, non-ferrous covers, necessary brackets and fasteners for top of door surface mounted units.
3. Closer finish shall be powder coated for better corrosion resistance. Painted finishes will not be accepted.
4. Closer products with any type of pressure relief valve system shall not be acceptable.
5. Closers shall be ISO 9000 certified. Units shall be stamped with date of manufacturer code.
6. Closers shall be non-sized, field adjustable from size 1 to 6.
7. Furnish non-sized closers with 1 1/2" diameter piston.
8. Do not through-bolt if there has been special blocking specified in wood door specification; refer to Section 08210.
9. Locate closers on interior side of exterior doors and on non-public side of interior doors, unless otherwise specified.
10. Provide manufacturers heaviest duty arm available at doors scheduled with parallel arm applications.
11. Provide plates, brackets and special templates when needed for interface with particular header door and wall conditions and adjacent hardware.

12. Closers shall be tested to 100 hours of salt spray test in compliance with ASTM B117; furnish data on request.
13. Acceptable Manufacturers:
 - a. Falcon: SC71 series
 - b. LCN: 4010/4110 series
 - c. Norton: 7500 series

2.6 FLUSHBOLTS

A. Flushbolts: ANSI/ BHMA A156.16

1. Provide minimum 1/2" diameter rods of brass or stainless steel, with minimum 12" long rods for doors up to 7'-0" in height. Provide longer rods as needed for doors exceeding 7'-0" in height.
2. Provide dustproof strikes for bottom flushbolt applications, except where special threshold construction provides non-recessed strike for bolt.
3. Finish: BHMA #626 (US26D)
4. Acceptable Manufacturers:
 - a. Ives: FB458
 - b. Rockwood: 555
 - c. Trimco: 3917

B. Automatic Flushbolts: ANSI/ BHMA A156.16

1. Provide automatic flushbolts for bottom of door and for top of door. When active leaf is opened bottom automatic flushbolts open.
2. Provide dust-proof strikes as scheduled for bottom flushbolt applications.
3. Provide coordinator as scheduled for proper door sequencing.
4. Finish: BHMA #630 (US32D)
5. Acceptable Manufacturers:
 - a. Ives: FB31B
 - b. Rockwood: 1842
 - c. Trimco: 3810

2.7 PUSH PLATES, PULL BARS, AND GRIPS

A. General Requirements: ANSI/ BHMA A156.6

1. Provide concealed mounting where possible. Where exposed fasteners are used, they shall be countersunk.
2. Push plates shall be beveled on four edges.
3. Where applicable plates shall be prepared to receive cylinder locks or thumb turns as scheduled.
4. Finish: BHMA #630 (US32D)

B. Push Plates:

1. Size: 4" x 16"
2. Thickness (US GA): 18 gauge; .050"
3. Acceptable Manufacturers:
 - a. Ives: 8200
 - b. Rockwood: 70C
 - c. Trimco: 1001-3

C. Pull Plates:

1. Size: 4" x 16"
2. Thickness (US GA): 18 gauge; .050"
3. Pull Size: 1" diameter; 10" center-to-center
4. Acceptable Manufacturers:
 - a. Ives: 8303-0
 - b. Rockwood: 111 x 70C
 - c. Trimco: 1017

D. Pull Bars: Offset "D" pull

1. Size: 3/4" diameter
2. Projection: 2 1/2"
3. Mounting: 10" center-to-center
4. Acceptable Manufacturers:
 - a. Trimco: 1191-3
 - b. Rockwood: BF157
 - c. Ives: 8190-0

2.8 DOOR PROTECTION DEVICES

A. General Requirements: ANSI/ BHMA A156.6

1. Fabricate protection plates (armor, kick, or mop) not more than 2" less than door width on stop side and not more than 2" less than door width on pull side, x height indicated.
2. Protection plates shall be beveled on three edges.
3. Furnish protection plates for concealed mounting where possible. Where exposed fasteners are used, they shall be countersunk.
4. Metal Plates: Stainless steel
 - a. Thickness (US GA): 18 gauge; .050"
5. Finish: BHMA #630 (US32D)

B. Kick Plates:

1. Size: 10"
2. Acceptable Manufacturers:
 - a. Ives: 8400
 - b. Rockwood: K1050
 - c. Trimco: K0050

2.9 OVERHEAD STOPS AND HOLDERS

A. Surface Mounted Overhead Holders/Stops: ANSI/ BHMA A156.8

1. Description: Medium-duty extruded brass, bronze or stainless steel stop/holders with shock absorber and no plastic parts
2. Finish: BHMA #630 (US32D)
3. Acceptable Manufacturers:
 - a. ABH: 4420 Series
 - b. GJ: 450 Series
 - c. Rixson: Medium Duty 10 Series

2.10 SEALS AND GASKETS

A. General Requirements: ANSI/ BHMA A156.22

1. Door Sweeps:
 - a. NGP as listed in sets

- b. Equal by Pemko or Reese
- 2. Weather-stripping: Apply to head and jamb stops.
 - a. NGP as listed in sets
 - b. Equal by Pemko or Reese
- 3. Meeting Stile Weather-stripping:
 - a. NGP as listed in sets
 - b. Equal by Pemko or Reese
- 4. Fire and Smoke Seals: Gaskets must comply with fire door assembly manufacture's installation instructions for use on (Category 'A') 20, 45, 60, 90 minute wood door assemblies. Perimeter Seals:
 - a. NGP as listed in sets
 - b. Pemko
 - c. Reese

2.11 THRESHOLDS

A. General Requirements: ANSI/ BHMA A156.21

- 1. Except as otherwise indicated provide standard threshold units of type, size and profile as shown or scheduled.
- 2. Metal: Extruded aluminum; 6063-T5 alloy
 - a. Finish: Clear anodized; BHMA #628 (US27)
- 3. Provide bumper seal thresholds with silicone foot seals.
- 4. Provide thresholds that are 1" wider than depth of frame.
- 5. Acceptable Manufacturers:
 - a. NGP
 - b. Pemko
 - c. Reese

2.12 AUXILIARY HARDWARE

A. Silencers: ANSI/ BHMA A156.16

- 1. Furnish tamper proof resilient cushions designed to absorb shock and noise at openings without gaskets.
- 2. Provide 3 silencers per single door, and 2 for pairs of doors.
- 3. Acceptable Manufacturers:
 - a. Ives: SR64
 - b. Rockwood: 608
 - c. Trimco: 1229A

B. Wall Bumpers: 2 1/2" diameter; 1" nominal projection

- 1. Finish: BHMA #626 (US26D)
- 2. Acceptable Manufacturers:
 - a. Ives: WS407CCV
 - b. Rockwood: 409
 - c. Trimco: 1270WV

C. Interior Floor-Mounted Stops: Dome stops with risers; 1" height

- 1. Finish: BHMA #626 (US26D)
- 2. Acceptable Manufacturers:
 - a. Ives: FS436
 - b. Rockwood: 440
 - c. Trimco: 1200

2.13 ACCESSORY HARDWARE

A. Key Cabinet:

1. Type: Two tag system with triple cross reference
2. Capacity: 150% greater than number of door keys needed
3. Provide a key cabinet complete with accessories set up with keys and hooks tagged, keys installed, and index cards completed. Install key cabinet in location as indicated on Drawings or as directed by Owner.
4. Acceptable Manufacturers:
 - a. Bommer: BKC Series
 - b. Lund: Lund Key Box
 - c. Salisbury: Model 1010

B. Key Keeper (knox box):

1. Type: Recessed mounted
2. Size (w x h x d): 6 1/2" x 6 1/2" x 5"
3. Finish: Satin aluminum
4. Provide key keepers for use by fire department. Install key keepers in compliance with authority having jurisdiction at locations indicated on Drawings or as directed by Owner.
5. Acceptable Manufacturers:
 - a. Knox: 3200 series x RMK or equal

2.14 ELECTRICALLY OPERATED HARDWARE

A. General Requirements:

1. Electrically operated locking devices shall be connected to building fire and smoke/heat alarm systems. Activation of alarm system shall disengage electric locking mechanism allowing free, unrestricted egress through opening.
2. Coordinate installation of electrically operated hardware to insure proper size wire is used to power load(s).
 - a. Voltage drop shall not exceed 5% of load's stated voltage.
 - b. Voltage drop shall be calculated by first determining resistance of load ($R=E/I$ voltage divided by AMP draw). Next, determine resistance of wire (per below chart). Divide this number by resistance of load. If result exceeds 5%, wire thickness shall be increased.
 - c. Wire length shall equal distance to load and back to supply (Lock 50 ft. from power supply; wire length = 100 ft.). Two loads powered by one pair of wires draw double current and have half (50%) of resistance.

<u>Wire Size</u>	<u>Resistance Per 1,000 Feet</u>
12 Gauge	1.6 OHM
14 Gauge	2.5 OHM
16 Gauge	4.1 OHM
18 Gauge	6.4 OHM
20 Gauge	10.1 OHM
22 Gauge	16.0 OHM

3. Furnish electrically operated hardware with power supply units, junction boxes, and other accessories needed for a complete, efficient installation.
4. Power Supply Units:
 - a. Power supply units shall be designed for electromagnetic locks, electric locking or monitoring exit devices, and/or electric strikes as needed.

- b. Output power shall be field selectable for either 24 volts DC at 1 ampere or 12 volts DC at 2 amperes. Input power shall be 120 volts AC at 0.6 ampere, unless otherwise indicated.
- c. Units shall have a terminal block that shall accept 14 gauge stranded wire.
- d. Enclosure shall have not less than six, 1/2" knock-out holes for conduit connection.

B. Power Transfer Devices:

- 1. Provide a means to transfer power from frame to door stile. Devices shall be reversible and allow a full 180° door swing with 4 1/2" x 4 1/2" butt hinges or 3/4" offset pivots. When door is in closed position, transfer unit shall be concealed.
- 2. Transfer units shall contain ten 24 awg UL approved conductors.
- 3. Rating: 10 Amps at 24 vdc (Class 1 low voltage)
- 4. Acceptable Manufacturers:
 - a. Securitron: EPT
 - b. Von Duprin: EPT10

C. Electric Strikes: ANSI/ BHMA A156.5, Grade 1

- 1. Electric strikes shall be listed by UL for burglary resistance.
- 2. Strikes shall be for use with mortise locks without deadbolt or cylindrical locks on single door; hollow metal or aluminum frame application.
- 3. Operation shall be fail safe.
- 4. Power Requirements: 24 VDC
- 5. Finish: BHMA #630 (US32D)
- 6. Acceptable Manufacturers:
 - a. Adams-Rite: 7900 Series
 - b. Locknetics: 9000 Series
 - c. Von Duprin: 6200 Series

2.15 CYLINDERS, KEYING SYSTEMS AND KEY CONTROL

A. General Requirements:

- 1. Meet with Architect and Owner to finalize keying requirements and obtain keying instructions in writing. Keying schedule shall be established in compliance with specific requirements determined in consultation with Owner.
- 2. Keys and key blanks shall be protected by one or more utility patents. This protection shall extend at least into year 2024.
- 3. Cylinders shall incorporate a dual mechanism to check for patented features on keys.
- 4. Cylinders shall be from same manufacturer as locks.
- 5. Provide temporary construction keying system during construction period. Permanent keys shall be furnished to Owner's Representative prior to occupancy. Owner or Owner's Security Agent will void operation of construction keys.

B. Cylinders:

- 1. Permanent cylinders shall be keyed by manufacturer and configured into sets or subsets, master keyed or great grand master keyed as directed by Owner.
- 2. Permanent keys and cylinders shall be marked with applicable blind code for identification. These visual key control marks or codes shall not include actual key cuts.
 - a. Key and cylinder identification stamping shall be approved by Architect and Owner. Failure to properly comply with these requirements shall be cause for replacement of cylinders and keys involved at no additional cost to Owner.

3. Equip locks and cylinders with patent protected, Best Peaks interchangeable core cylinders. Cylinders shall allow for multiplex master keying, configured to Owner's instructions.

C. Key Material:

1. Provide manufacturer's standard embossed keys of nickel silver with a minimum thickness of 0.092" to ensure durability. Key Quantity: Furnish keys in following quantities:
 - a. Master Keys: 6 per master group
 - b. Change Keys:
 - (1) Locks Keyed Alike: 4 per set
 - (2) Locks Keyed Different: 3 per lock
 - c. Key Blanks: 6 per cylinder
 - d. Temporary Construction Master Keys: 12 total
 - e. Control Keys: 5 total
2. Deliver end user exclusive permanent key blanks and other security keys directly to Owner's representative from manufacturer by secure courier, return receipt requested. Failure to properly comply with these requirements shall be cause for replacement of cylinders and keys involved at no additional cost to Owner.

D. Acceptable Manufacturers:

1. Cylinders and Keys: Best- Peaks interchangeable core cylinders- No Substitutions

PART 3 EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

1. Examine doors and frames with Installer present for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
2. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.
4. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

3.2 PREPARATION

A. Surface Preparation:

1. Steel Doors and Frames: Comply with DHI A115 Series
 - a. Surface-Applied Door Hardware: Drill and tap doors and frames in compliance with SDI 109
2. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

A. General Requirements:

1. Install each door hardware item to comply with manufacturers' written instructions using manufacturers' supplied fasteners.

2. Securely install finish hardware items in compliance with accepted schedule and templates furnished with hardware.
3. Install mortised items flush with adjacent surfaces.
4. Install locksets, surface mounted closers, and trim after finishing of doors and frames is complete.
 - a. Where cutting and fitting is needed to install door hardware onto or into surfaces that are to be painted or finished in another way later, coordinate removal, storage, and reinstallation of door hardware with finishing work.
5. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
6. Drill and countersink units not factory-prepared for anchorage fasteners. Space fasteners and anchors in compliance with industry standards.

B. Mounting Heights:

1. Mount door hardware units at heights indicated in following applicable publications, unless otherwise specifically indicated or required to comply with governing regulations:
 - a. Steel Doors and Frames: ANSI A250.6
 - (1) DHI Publication *Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames*
 - (2) DHI Publication *Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames*
 - b. Wood Doors: DHI Publication WDHS-3

C. Electrically Operated Hardware:

1. Comply with manufacturer's instructions for wiring, grounding, and shielding.
2. Locate boxed power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
3. Provide one power supply for each door opening.

D. Door Stops:

1. Door stops shall be furnished for every door leaf. Install floor-mounted or wall-mounted stops, as scheduled. Overhead door holder shall be provided where floor or wall stops cannot be used.
2. Place door stops in such a position that they permit maximum door swing, but do not present a hazard or obstruction. Furnish floor strikes for floor holders of proper height to engage holders of doors.
3. Floor stops shall be installed with risers as needed to accommodate finish flooring materials for proper relationship to door.

E. Thresholds:

1. Set thresholds for exterior and acoustical doors in full bed of sealant in compliance with requirements specified in Division 7.

F. Key Control System:

1. Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

3.4 ADJUSTING

A. Initial Adjustment:

1. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
2. Adjust electric strikes horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Adjust door closer sweep period so that from an open position of 70 degrees door will take at least 3 seconds to move to a point 3" from latch measured to leading edge of door.

B. Final Adjustment:

1. Return to Project during week prior to Substantial Completion and make final check and adjustment of hardware items.
2. Adjust hardware so doors operate in perfect order. Test and adjust hardware for quiet, smooth operation, free of sticking, binding, or rattling. Adjust closers for proper, smooth operation.
3. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

C. Six Month Adjustment:

1. Approximately six months after Date of Substantial Completion, installer shall perform following:
 - a. Examine and readjust each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
 - b. Consult with, and instruct, Owner's personnel on recommended maintenance procedures.
 - c. Replace door hardware items that have deteriorated or failed due to faulty design, materials, or installation.

3.5 CLEANING

- A. Exposed hardware shall be carefully cleaned by methods not injurious to finish, immediately preceding occupancy. Replace defective, damaged, or missing hardware.
- B. Clean adjacent surfaces soiled by hardware installation.
- C. Clean operating items as needed to restore proper function and finish.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.7 PROTECTION

- A. Provide final protection and maintain conditions that ensure door hardware shall be without damage or deterioration at time of Substantial Completion.
- B. Protect door hardware items from abuse, corrosion and other damage until Owner accepts Project as complete.

3.8 DOOR HARDWARE SCHEDULE

A. General Requirements:

1. To define requirements for materials, size, and design specific products manufactured by certain manufacturers are indicated in door hardware sets.
 - a. Door hardware sets provide quantity, item, size, finish or color indicated and named manufacturer's product.
 - b. Provide description of operation for all electrical hardware openings.

B. Hardware Sets: List of manufacturers represented in the hardware sets:

1. Hinges: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 2. Continuous Hinges: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 3. Flush Bolts: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 4. Cylinder & Keys: Best – 800-711-6814 – www.bestaccess.com (BES)
 5. Locksets & Latchsets: Schlage – 800-864-1864 – www.schlage.com (SCH)
 6. Exit Devices & FEH: Falcon- 800-266-4456- www.falcon.ingersollrand.com (FAL)
 7. Push/Pull Bars: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 8. Push/Pull Plates: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 9. Surface Closers: Falcon – 800-266-4456 – www.falcon.ingersollrand.com (FAL)
 10. Overhead Stop/holders: Glyn-Johnson – 800-525-0336– www.glynn-johnson.com (GJH)
 11. Wall & Floor Stops: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 12. Protective Plates: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 13. Thresholds: NGP- 800- NGP-RUSH- www.ngp.com (NGP)
 14. Weatherstrip & Gasket: NGP- 800- NGP-RUSH- www.ngp.com (NGP)
 15. Silencers: H. B. Ives – 877-613-8766 – www.iveshardware.com (IVE)
 16. Electric Strikes: Von Duprin – 800-999-0408 – www.vonduprin.com (VON)
 17. Power Supplies: Schlage Elec. – 866-322-1237 – www.schlage.com (SCE)
- Von Duprin – 800-999-0408 – www.vonduprin.com (VON)

SPECWORKS # 94104-B7C63SMMH

HW SET: 01

2	EA	POWER TRANSFER	EPT-10	689	VON
2	EA	CONTINUOUS HINGE	112HD EPT	628	IVE
1	EA	PANIC DEVICE	AE-25-C-EO	630	FAL
1	EA	PANIC DEVICE	AE-EL-25-C-NL-OP	630	FAL
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
2	EA	OFFSET DOOR PULL	8190-0-O	630	IVE
2	EA	SURFACE CLOSER	SC71 SS	689	FAL
2	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O
1	EA	THRESHOLD	896S		AL NGP
1	EA	POWER SUPPLY	PS873-2		GRY VON
1	EA		PROX CARD READER BY OTHERS		B/O

DOORS ARE NORMALLY CLOSED AND LOCKED. PRESENTING CARD TO READER WILL UNLOCK ACTIVE DOOR LEAF ALLOWING INGRESS. FREE EGRESS FROM BOTH DOORS AT ALL TIMES. "AE" IS A REQUEST TO EXIT SWITCH. "EL" IS ELECTRIC LATCH RETRACTION.

HW SET: 02

1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	CONTINUOUS HINGE	700 EPT	630	IVE
1	EA	EXIT ALARM	HWEA-25-R-EO	630	FAL
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
1	EA	SURFACE CLOSER	SC71 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	700SA	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8426	AL	NGP
1	EA	POWER SUPPLY	PS861	GRY	VON

DOOR IS EQUIPPED WITH AN EMERGENCY EXIT ALARM PANIC DEVICE. DEPRESSING TOUCHBAR WILL SET OFF A CONTINUOUS ALARM. ALARM MAY BE RESET WITH CYLINDER INTEGRAL TO EXIT DEVICE.

HW SET: 03

2	EA	CONTINUOUS HINGE	112HD	628	IVE
1	EA	PANIC DEVICE	25-C-EO	630	FAL
1	EA	PANIC DEVICE	25-C-NL-OP	630	FAL
1	EA	RIM CYLINDER	20-057-ICX	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
2	EA	OFFSET DOOR PULL	8190-0-O	630	IVE
2	EA	SURFACE CLOSER	SC71 DS	689	FAL
2	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O
1	EA	THRESHOLD	896S	AL	NGP

HW SET: 04

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 DS	689	FAL
1	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 05

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE

DOOR HARDWARE

Rappahannock Community College Renovation
Glenns and Warsaw, Virginia

08710 - 20
PC: 260-17712
5/11/2010

3	EA	SILENCER	SR64	GRY	IVE
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HW SET: 06

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8303-0 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	SC71 RW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 07

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 08

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
2	EA	OVERHEAD STOP	450S	630	GLY
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 08A

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
2	EA	OVERHEAD STOP	450S	630	GLY
2	EA	SILENCER	SR64	GRY	IVE

HW SET: 09

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 09A

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	ELECTRIC STRIKE	6211AL FSE EB 24VDC	630	VON
1	EA	SURFACE CLOSER	SC71 RW/PA	689	FAL
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O
1	EA	POWER SUPPLY	505-ULAC		SCE
1	EA		PROX CARD READER BY OTHERS		B/O

DOOR IS NORMALLY CLOSED AND LOCKED. PRESENTING CARD TO READER WILL UNLOCK DOOR ALLOWING INGRESS. FREE EGRESS AT ALL TIMES. ELECTRIC STRIKE WILL FAIL SECURE IN THE EVENT OF A POWER OUTAGE.

HW SET: 09B

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	ELECTRIC STRIKE	6210 FSE EB 24VDC	630	VON
1	EA	SURFACE CLOSER	SC71 RW/PA	689	FAL
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	505-ULAC		SCE
1	EA		PROX CARD READER BY OTHERS		B/O

DOOR IS NORMALLY CLOSED AND LOCKED. PRESENTING CARD TO READER WILL UNLOCK DOOR ALLOWING INGRESS. FREE EGRESS AT ALL TIMES. ELECTRIC STRIKE WILL FAIL SECURE IN THE EVENT OF A POWER OUTAGE.

HW SET: 10

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HW/PA	689	FAL
1	EA	MOUNTING PLATE	SC70-18	689	FAL
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 11

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 17A	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 12

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 13

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PANIC DEVICE	25-C-EO-LBR	630	FAL
1	EA	PANIC DEVICE	25-C-L-LBR	630	FAL
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
2	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
2	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 14

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	ELECTRIC STRIKE	6210 FSE EB 24VDC	630	VON
1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	505-ULAC		SCE
1	EA		PROX CARD READER BY OTHERS		B/O

DOOR IS NORMALLY CLOSED AND LOCKED. PRESENTING CARD TO READER WILL UNLOCK DOOR ALLOWING INGRESS. FREE EGRESS AT ALL TIMES. ELECTRIC STRIKE WILL FAIL SECURE IN THE EVENT OF A POWER OUTAGE.

HW SET: 15

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HW/PA	689	FAL
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 16

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC DEVICE	25-R-L	630	FAL

DOOR HARDWARE

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1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 17 - NOT USED

HW SET: 18

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC DEVICE	25-R-L-NL	630	FAL
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	5050B	BRN	NGP
1	EA	DOOR SWEEP	C607A	AL	NGP

HW SET: 19

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY SET	L9040 17A	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 20

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 21

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC DEVICE	25-R-L-NL	630	FAL
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
1	EA	SURFACE CLOSER	SC71 SS/HO	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	700SA	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8426	AL	NGP

DOOR HARDWARE

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HW SET: 22

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 RW/PA	689	FAL
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 23

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 RW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

HW SET: 24

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT DEVICE	F-25-V-EO	630	FAL
1	EA	FIRE EXIT DEVICE	F-25-V-L	630	FAL
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
2	EA	SURFACE CLOSER	SC71 DS	689	FAL
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE

HW SET: 25

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT DEVICE	F-25-R-L	630	FAL
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	MORTISE CYLINDER	26-091-ICX	626	SCH
1	EA	SURFACE CLOSER	SC71 DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE

HW SET: 26

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH

DOOR HARDWARE

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1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
1	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 27

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 28

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	DOMESTOP	FS436	626	IVE
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 29

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 30

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	DOMESTOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 31

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HW/PA	689	FAL
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
2	EA	DOMESTOP	FS436	626	IVE
1	EA	SEALS	5060B 7'	BRN	NGP
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

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HW SET: 32

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 HO/DS	689	FAL
2	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436	626	IVE
2	EA	SILENCER	SR64	GRY	IVE

HW SET: 33

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	PANIC DEVICE	25-C-L-BE-LBR	630	FAL
2	EA	SURFACE CLOSER	SC71 DS	689	FAL
2	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 34

6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	OFFICE LOCK	L9050T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB2	689	IVE
2	EA	SURFACE CLOSER	SC71 DS	689	FAL
2	EA	MOUNTING PLATE	SC70-18PA	689	FAL
1	SET	SEALS	INTEGRAL SEALS BY FRAME MFR.		B/O

HW SET: 35

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC71 SS/HO	689	FAL
1	SET	SEALS	700SA	AL	NGP
1	EA	DOOR SWEEP	C627A	AL	NGP
1	EA	THRESHOLD	8426	AL	NGP

HW SET: 36

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 17A	626	SCH
1	EA	PRIMUS CORE ONLY	20-740-XP	626	SCH

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1	EA	SURFACE CLOSER	SC71 DS
1	SET	SEALS	107SA
1	EA	DOOR BOTTOM	220SA
1	EA	THRESHOLD	950S

689	FAL
AL	NGP
AL	NGP
AL	NGP

END OF SECTION

SECTION 08800

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07900 - Joint Sealers: Sealant and back-up material.
- B. Section 08211 - Flush Wood Doors: Glazed doors.
- C. Section 08410 - Metal-Framed Storefronts.
- D. Section 08830 - Mirrors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005.
- C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2005.
- D. ASTM C 1036 - Standard Specification for Flat Glass; 2006.
- E. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 2004.
- F. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2009.
- G. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2007.
- H. ASTM E 2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2008.
- I. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2004.
- J. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 1990.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.
- B. Installer Qualifications: Company specializing in performing the work of this section approved by manufacturer.

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GLAZING TYPES

- A. Type I-3 - Sealed Insulating Glass Units: Vision glazing.
 - 1. Application(s): Interior sound resistant window.
 - 2. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 3. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Tint: Clear.
 - 4. Total Thickness: 1 inch.
 - 5. Glazing Method: Gasket glazing.
- B. Type I-1 - Sealed Insulating Glass Units: Vision glazing, low-E.
 - 1. Application(s): All exterior glazing unless otherwise indicated.
 - 2. Basis of Design: PPG Industries, Inc: www.ppgideascales.com.
 - 3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - a. Coating: PPG Solarban 80 on #2 surface, no coating on #3 surface.
 - b. Tint: None (clear).
 - 4. Inboard Lite: Annealed float glass, 1/4 inch thick.
 - a. Tint: None (clear).
 - 5. Total Thickness: 1 inch.
- C. Type I-2 - Sealed Insulating Glass Units: Safety glazing:
 - 1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in exterior doors.
 - b. Glazed sidelights and panels next to doors.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on the drawings.
 - 2. Type: Same as other vision glazing except use fully tempered float glass for both outboard and inboard lites.
 - 3. Tint: Clear.
- D. Type G-1 - Single Vision Glazing:
 - 1. Applications: All interior glazing unless otherwise indicated.
 - 2. Type: Annealed float glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch.
 - 5. Glazing Method: Gasket glazing.
- E. Fire-Rated Safety Glazing:
 - 1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in fire doors.
 - 2. Fire Rating: As indicated on the drawings.
 - 3. Thickness: 1/4 inch.
 - 4. Glazing Method: As required for fire rating.
- F. Type G-2 - Single Safety Glazing: Non-fire-rated.
 - 1. Applications: Provide this type of glazing in the following locations:

- a. Glazed lites in doors, except fire doors.
- b. Glazed sidelights to doors, except in fire-rated walls and partitions.
- c. Other locations required by applicable federal, state, and local codes and regulations.
- d. Other locations indicated on the drawings.
2. Type: Fully tempered float glass as specified.
3. Tint: Clear.
4. Thickness: 1/4 inch.
5. Glazing Method: Gasket glazing.

2.02 EXTERIOR GLAZING ASSEMBLIES

- A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with 2006 code.
 1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.
 2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
 3. Thicknesses listed are minimum.

2.03 GLASS MATERIALS

- A. Float Glass Manufacturers:
 1. AGC Flat Glass North America, Inc: www.afgglass.com.
 2. Guardian Industries Corp: www.sunguardglass.com.
 3. PPG Industries, Inc: www.ppg.com.
 4. Substitutions: Refer to Section 01600 - Product Requirements.
- B. Float Glass: All glazing is to be float glass unless otherwise indicated.
 1. Annealed Type: ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 2. Heat-Strengthened and Fully Tempered Types: ASTM C 1048.
 3. Tinted Types: Color and performance characteristics as indicated.
 4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.
- C. Laminated Wired Glass: UL- or WH-listed as fire-protection-rated glazing and complying with 16 CFR 1201 test requirements for Category II without the use of a surface-applied film.

2.04 SEALED INSULATING GLASS UNITS

- A. Manufacturers:
 1. Any of the manufacturers specified for float glass.
- B. Sealed Insulating Glass Units: Types as indicated.
 1. Locations: Exterior, except as otherwise indicated.
 2. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
 3. Edge Spacers: Aluminum, bent and soldered corners.
 4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
 5. Purge interpane space with dry hermetic air.

2.05 GLAZING COMPOUNDS

- A. Manufacturers:
 1. Bostik Inc: www.bostik-us.com.
 2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
 3. Pecora Corporation: www.pecora.com.
 4. BASF Construction Chemicals-Building Systems: www.chemrex.com.
 5. Substitutions: Refer to Section 01600 - Product Requirements.

- B. Butyl Sealant: Single component; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; Shore A hardness of 10 to 20; black color; non-skinning.

2.06 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C 864 Option I; black color.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Prime surfaces scheduled to receive sealant.
- B. Install sealants in accordance with ASTM C 1193 and FGMA Sealant Manual.
- C. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

- A. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.04 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION

SECTION 08830

MIRRORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.

1.02 REFERENCE STANDARDS

- A. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2004.
- B. GANA (TIPS) - Mirrors Handle with Extreme Care: Tips For the Professional on the Care and Handling of Mirrors; National Association of Mirror Manufacturers; 2004 (<http://www.mirrorlink.org/members/technical.htm>).

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data on Mirror Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in VCCS's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA (TIPS) "Mirrors Handle with Extreme Care: Tips For the Professional on the Care and Handling of Mirrors."

1.05 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.06 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Arch Aluminum & Glass Co., Inc: www.arch.amarlite.com.
 - 2. Binswanger Mirror/ACI Distribution: www.binswangermirror.com.
 - 3. Lenoir Mirror Co: www.lenoirmirror.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 MATERIALS

- A. Mirror Glass - General: Select materials and/or provide supports as required to limit mirrored glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.
- B. Mirror Glass: Clear float type with copper and silver coating, organic overcoating, square and lapped edges, 1/4 inch thick minimum.
 - 1. Sizes noted on Drawings.

2.03 GLAZING ACCESSORIES

- A. Mirror Adhesive: Chemically compatible with mirror coating and wall substrate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for mirrored glazing are correctly sized and within tolerance.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION - GENERAL

- A. Install mirrors in accordance with GANA recommendations.
- B. Set mirrors plumb and level, free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
- D. Frameless Mirrors: Set mirrors with adhesive, applied in accordance with adhesive manufacturer's instructions.

3.04 CLEANING

- A. Remove labels after work is complete.
- B. Clean mirrors and adjacent surfaces.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Gypsum sheathing.
- F. Cementitious backing board.
- G. Gypsum wallboard.
- H. Joint treatment and accessories.
- I. Water-resistive barrier over exterior wall sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 05400 - Cold Formed Metal Framing: Exterior wind-load-bearing metal stud framing.
- B. Section 06100 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07900 - Joint Sealers: Acoustic sealant.

1.03 REFERENCE STANDARDS

- A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)
- B. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 1999 (R2005).
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (R2005).
- D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2007.
- E. ASTM C 475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).
- F. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2007.
- G. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.
- H. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2007.
- I. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 2007.
- J. ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2007.

- K. ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.
- L. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2005.
- M. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2006.
- N. ASTM C 1280 - Standard Specification for Application of Gypsum Sheathing; 2007.
- O. ASTM C 1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Substrate Sheets; 2004.
- P. ASTM C 1396/C 1396M - Standard Specification for Gypsum Board; 2006a.
- Q. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2000 (Reapproved 2005).
- R. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2004.
- S. ASTM E 413 - Classification for Rating Sound Insulation; 2004.
- T. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2007.
- U. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association; 1996.
- V. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, and accessories.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board application and finishing.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C 840 and GA-216.
- B. Interior Partitions Indicated as Sound-Rated: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E 413, based on tests conducted in accordance with ASTM E 90.
- C. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
 - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clark Western Building Systems: www.clarkwestern.com.

2. Dietrich Metal Framing: www.dietrichindustries.com.
 3. MarinoWare: www.marinoware.com.
 4. Phillips Manufacturing Company: www.phillipsmfg.com.
- B. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
1. Studs: "C" shaped with flat or formed webs.
 2. Runners: U shaped, sized to match studs.
 3. Ceiling Channels: C shaped.
- C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05400.
- D. Ceiling Hangers: Type and size as specified in ASTM C 754 for spacing required.
- E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
 2. Material: ASTM A 653/A 653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
 4. Deflection and Firestop Track:
 - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum: www.americangypsum.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Georgia-Pacific Gypsum LLC: www.gp.com/gypsum.
 4. National Gypsum Company: www.nationalgypsum.com.
 5. USG Corporation: www.usg.com.
- B. Wallboard: Paper-faced gypsum wallboard as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D 3273.
 - a. Mold-resistant board is required where indicated in the drawings.
 3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness: As indicated in the drawings.
 - a. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 5. Mold-Resistant Paper-Faced Products:
 - a. American Gypsum; M-Bloc.
 - b. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
 - c. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
 - d. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.
 - e. Substitutions: See Section 01600 - Product Requirements.
- C. Backing Board For Wet Areas: Cement Board
1. Application: Surfaces behind tile in wet areas including bathrooms.

2. ANSI Cement-Based Board: Non-gypsum-based; aggregated portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C 1325.
 - a. Thickness: 1/2 inch.
 - b. Products:
 - 1) Custom Building Products; Wonderboard.
 - 2) National Gypsum Company; PermaBase Brand Cement Board.
 - 3) National Gypsum Company; PermaBase Flex Brand Cement Board.
 - 4) USG Corporation; Durock Brand Cement Board.
- D. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
 1. Application: Exterior sheathing, unless otherwise indicated.
 2. Glass-Mat-Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C 1177/C 1177M.
 3. Core Type: Regular.
 4. Regular Board Thickness: 1/2 inch.
 5. Edges: Square, for vertical application.
 6. Glass-Mat-Faced Products:
 - a. CertainTeed Corporation; GlasRoc Brand.
 - b. Georgia-Pacific Gypsum LLC; DensGlass Gold Sheathing.
 - c. National Gypsum Company; Gold Bond Brand e2XP Extended Exposure Sheathing.
- E. Exterior Soffit Board: Exterior gypsum soffit board as defined in ASTM C 1396/C 1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Ceilings and soffits in protected exterior areas, unless otherwise indicated.
 2. Types: Regular, in locations indicated.
 3. Regular Type Thickness: 1/2 inch.
 4. Edges: Tapered.
 5. Products:
 - a. American Gypsum; Exterior Soffit Wallboard.
 - b. CertainTeed Corporation; ProRoc Brand Exterior Soffit Board.
 - c. Georgia-Pacific Gypsum LLC; ToughRock Soffit Board.
 - d. National Gypsum Company; Gold Bond Brand Exterior Soffit Board.
 - e. USG Corporation; Sheetrock Exterior Gypsum Ceiling Board.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 inch.
- B. Acoustic Sealant: As specified in Section 07900.
- C. Water-Resistive Barrier: No. 15 asphalt felt.
- D. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
 1. Types: As detailed or required for finished appearance.
 2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
- E. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
 1. Tape: 2 inch wide, coated glass fiber tape for joints and corners.
 2. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 3. Ready-mixed vinyl-based joint compound.
- F. High Build Drywall Surfacers: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

- G. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C 1002; self-piercing tapping type.
- H. Screws for Attachment to Steel Members From 0.033 to 0.112 inch in Thickness: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C 754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
- C. Studs: Space studs as scheduled.
 - 1. Extend partition framing as indicated in the drawings.
 - 2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 1 inch from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
- F. Blocking: Install wood blocking for support of:
 - 1. Wall mounted cabinets.
 - 2. Toilet partitions.
 - 3. Toilet accessories.
 - 4. other locations indicated in the drawings

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C 840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed perpendicular to framing or furring members, with ends and edges occurring over firm bearing. Place second layer parallel to framing or furring members. Offset joints of second layer from joints of first layer.

- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exterior Sheathing: Comply with ASTM C 1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- F. Exterior Soffit Board: Install perpendicular to framing, with staggered end joints over framing members or other solid backing.
- G. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- H. Installation on Metal Framing: Use screws for attachment of all gypsum board.
- I. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.
- J. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
 - 5. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
- D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09290

ACOUSTICALLY ENHANCED GYPSUM BOARD

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Acoustically Enhanced Gypsum Board

1.02 PERFORMANCE CRITERIA

- B. Acoustically Enhanced Gypsum Board:
 - 1. Wall Assembly STC: 60
 - 2. Wall Assembly Fire-Resistance Rating: Non-rated and 1-Hour

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. National Gypsum Company: www.nationalgypsum.com
- B. Certaineed: www.certainteed.com
- C. USG: www.usg.com

2.02 ACOUSTICALLY ENHANCED GYPSUM BOARD

- D. Panel Physical Characteristics
- E.
 - 1. Inner layer: Viscoelastic damping polymer
 - 2. Outer layer: Enhanced high density mold-resistant gypsum board
 - 3. Long Edges: Tapered
 - 4. Overall thickness: 5/8 inch

2.03 ACCESSORIES

- F. Joint Treatment
 - 1. Tape: 2-1/16in. wide paper reinforcing tape.
 - 2. Compound: Drying type pre-mixed vinyl base compound.
 - 3. Compound: Drying type vinyl base topping compound, pre-mixed.

PART 3 - EXECUTION

3.01 INSTALLATION, ACOUSTICALLY ENHANCED GYPSUM BOARD

- A. Install in accordance with manufacturer recommendations.
- B. Double Layer - 3-5/8 inch metal stud construction (1-Hour rated when required; STC 60) or 6 inch metal stud construction (1-Hour rated when required; STC 61)
 - 1. Apply acoustically enhanced gypsum board vertically to one side of metal studs using 1-inch Type S screws, 12 inches on center. Apply face layer of Type X gypsum board vertically using 1-5/8 inch Type S screws, 12 inches on center.

2. Opposite side: apply two layers of Type X gypsum board vertically, using 1-inch Type S screws for base layer and 1-5/8 inch Type S screws for face layer, both at 12 inches on center.
3. Stagger vertical joints 24 inches each layer and opposite sides.

END SECTION

SECTION 09300

TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic accessories.
- D. Ceramic trim.

1.02 REFERENCE STANDARDS

- A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2005.
 - 1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2005.
 - 2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 1999 (R2005).
 - 3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement Mortar; 1999 (R2005).
 - 4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 1999 (R2005).
 - 5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (R2005).
 - 6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (R2005).
 - 7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (R2005).
 - 8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (R2005).
 - 9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (R2005).
 - 10. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 1999 (R2005).
 - 11. ANSI A118.1 - American National Standard Specifications for Dry-Set Portland Cement Mortar; 1999 (R2005).
 - 12. ANSI A118.4 - American National Standard Specifications for Latex-Portland Cement Mortar; 1999 (R2005).
 - 13. ANSI A118.7 - American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation; 1999 (R2005).
 - 14. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile; 1999 (R2005).
 - 15. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2008.
- B. TCA (HB) - Handbook for Ceramic Tile Installation; Tile Council of North America, Inc.; 2007/2008.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Samples: Three samples of each type, minimum 12x12 inches in size.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
- E. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 2 percent percent of each size, color, and surface finish combination, but not less than 10 tiles of each type.

1.04 QUALITY ASSURANCE

- A. Maintain one copy of TCA Handbook and ANSI A108 Series/A118 Series on site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.06 FIELD CONDITIONS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

- A. Manufacturers: All products by the same manufacturer.
 - 1. Mission Stone Tile: www.missionstonetile.com
 - 2. American Olean: www.americanolean.com.
 - 3. Dal-Tile Corporation: www.daltile.com.
 - 4. Crossville Ceramics, Inc.: www.crossvilleinc.com.
 - 5. Substitutions: See Section 01600 - Product Requirements.
- B. Ceramic Mosaic Tile: ANSI A137.1, and as follows:
 - 1. Moisture Absorption: 0 to 0.5 percent.
 - 2. Size and Shape: As scheduled on the drawings.
 - 3. Edges: Square.
 - 4. Surface Finish: Unglazed.
 - 5. Colors: As shown on drawings.
- C. Paver Tile: ANSI A137.1, and as follows:
 - 1. Moisture Absorption: 0 to 0.5 percent.
 - 2. Size and Shape: As scheduled on the drawings.
 - 3. Thickness: 3/8 inch
 - 4. Edges: Square.
 - 5. Surface Finish: Unglazed.
 - 6. Colors: As scheduled.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching bullnose and cove base ceramic shapes in sizes indicated.
 - 1. Applications: Use in the following locations:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base.

2. Manufacturer: Same as for tile.

2.03 ADHESIVE MATERIALS

- A. Manufacturers:
 1. Bonsal American, Inc: www.prospec.com
 2. Bostik Inc: www.bostik-us.com.
 3. Mapei Corporation: www.mapei.com.
 4. Substitutions: See Section 01600 - Product Requirements.
- B. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.

2.04 MORTAR MATERIALS

- A. Manufacturers:
 1. Bonsal American, Inc: www.prospec.com
 2. Bostik Inc: www.bostik-us.com.
 3. Custom Building Products: www.custombuildingproducts.com.
 4. Mapei Corporation: www.mapei.com
 5. Substitutions: See Section 01600 - Product Requirements.
- B. Mortar Bond Coat Materials:
 1. Dry-Set Portland Cement type: ANSI A118.1.
 2. Latex-Portland Cement type: ANSI A118.4.

2.05 GROUT MATERIALS

- A. Manufacturers:
 1. Bonsal American, Inc: www.prospec.com
 2. Bostik Inc: www.bostik-us.com.
 3. Mapei Corporation: www.mapei.com
 4. Substitutions: See Section 01600 - Product Requirements.
- B. Grout: Polymer modified cement grout, sanded, as specified in ANSI A118.7.
 1. Colors: As scheduled.

2.06 ACCESSORY MATERIALS

- A. Uncoupling Membrane: 1/8 inch thick polyurethane matting with three-dimensional grid structure with dovetail shaped cavities and fleece webbing laminated to the underside to provide a mechanical bond to the substrate adhesive (DITRA).
- B. Membrane at Walls: No. 15 asphalt saturated felt.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- B. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.

- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnosed.
- F. Sound tile after setting. Replace hollow sounding units.
- G. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- H. Allow tile to set for a minimum of 48 hours prior to grouting.
- I. Grout tile joints. Use standard grout unless otherwise indicated.
- J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
 - 1. Use uncoupling membrane under all tile unless other underlayment is indicated.

3.05 INSTALLATION - WALL TILE

- A. Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244, using membrane at toilet rooms.
- B. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 07900 - Joint Sealers: Acoustical sealant.
- B. Section 08310 - Access Doors and Panels: Access panels.
- C. Section 16721 - Addressable Fire Detection & Alarm System: Fire alarm components in ceiling system.
- D. Section 13930 - Wet-Pipe Sprinkler Systems With Fire Pump: Sprinkler heads in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2000.
- B. ASTM C 636/C 636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2004.
- C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2004
- D. ASTM E 580/E 580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2008a.
- E. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 2008.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Samples: Submit two samples 4x4 inch in size minimum illustrating material and finish of acoustical units.
- D. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers:
 - 1. Armstrong World Industries, Inc: www.armstrong.com.
 - 2. CertainTeed Corporation: www.certainteed.com.
 - 3. USG: www.usg.com.
- B. Acoustical Units - General: ASTM E 1264, Class A.
 - 1. Maximum Flame Spread/Smoke Development Values per ASTM E84: 25/450.
- C. Acoustical Tile Type 1: Painted mineral fiber, ASTM E 1264 Type III, with the following characteristics:
 - 1. Size: 24 x 24 inches.
 - 2. Thickness: 5/8 inches.
 - 3. Light Reflectance: 83 percent, determined as specified in ASTM E 1264.
 - 4. NRC Range: 0.50, determined as specified in ASTM E 1264.
 - 5. Ceiling Attenuation Class (CAC): 35, determined as specified in ASTM E 1264.
 - 6. Edge: Angled Tegal.
 - 7. Surface Color: White.
 - 8. Surface Pattern: Fine Texture.
 - 9. Basis of Design Product: Dune by Armstrong.
 - 10. Sag Resistant.
 - 11. Mold, Mildew, and bacteria resistant.
 - 12. Suspension System: Exposed grid Type 1.
- D. Acoustical Panels Type 2: Painted mineral fiber, ASTM E 1264 Type III, with the following characteristics:
 - 1. Size: 24 x 24 inches.
 - 2. Thickness: 5/8 inches.
 - 3. Composition: Wet felted.
 - 4. NRC Range: .55, determined as specified in ASTM E 1264.
 - 5. Ceiling Attenuation Class (CAC): 33, determined as specified in ASTM E 1264.
 - 6. Edge: Square.
 - 7. Surface Color: Black.
 - 8. Surface Pattern: Perforated, small holes.
 - 9. Basis of Design Product: Fine Fissured by Armstrong.
 - 10. Suspension System: Exposed grid Type 2.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 - 1. Same as for acoustical units.
- B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, and perimeter moldings as required.
 - 1. Suspension systems shall be of adequate strength to support flexible sprinkler head mounting brackets.
- C. Exposed Steel Suspension System Type 1: Formed steel, commercial quality cold rolled; intermediate-duty.
 - 1. Profile: Tee; 15/16 inch wide face.

2. Construction: Double web.
 3. Finish: White painted.
- D. Exposed Steel Suspension System Type 2: Formed steel, commercial quality cold rolled; intermediate-duty.
1. Profile: Tee; 15/16 inch wide face.
 2. Construction: Double web.
 3. Finish: Black painted.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
1. Hanger wires to be minimum 12 gauge.
- B. Perimeter Moldings: Same material and finish as grid.
1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Touch-up Paint: Type and color to match acoustical and grid units.

2.04 CUSTOM PERIMETER TRIM

- A. Manufacturer: Same as for grid.
- B. Components: Edge trim system for transitions between drywall and suspended ceilings. Extruded aluminum alloy trim channel, 10 foot straight or curved channel. Attachment to grid system is to be provided by specially designed tee-bar connection clips, which lock into specially designed bosses on the perimeter trim channel and are screw-attached to the web of the intersecting suspension system members. Sections of trim are to be joined together using splice plates.
1. Curved Transition Channel for Tegal: 6 inch high curved channel to minimum inside and outside radii sections indicated on the drawings with special bosses formed for attachment to the tee-bar connection clip or hanging clip; commercial quality, extruded aluminum, factory-finished to match ceiling grid.
 2. Splice Plate: Galvanized steel finish; formed to fit into special bosses and locked in place with 4 factory-installed screws.
 3. Tee-Bar Connection Clip: Galvanized steel finished to match trim channel formed to fit into special bosses and locked in place by factory-installed screws and attached to suspension system members.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION- SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.

- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Miter corners.
- K. Hanger Wires:
 - 1. Suspension wires made of galvanized steel shall not be smaller than number 12 gauge and spaced no more than 4 feet on center along main runners unless calculations justifying the increased spacing are provided.
 - 2. The wire must be wrapped around itself a minimum of (3) full turns (360 degrees each) within a 3 inch length.
 - 3. Each vertical wire shall be attached to the ceiling suspension member and to the support above such that the wire loops shall be tightly wrapped and sharply bent to prevent any vertical movement or rotation of the member within the loops.
 - 4. Suspension wires shall not hang more than 1 in 6 out of plumb unless counter-sloping wires are provided.
 - 5. Wires shall not attach to or bend around interfering material or equipment.
 - 6. Main runners shall be attached and leveled to within 1/4 inch in 10 feet. Determine elevation of levelness from measurements taken below hanger points and after completion of the ceiling installations.
- L. Main Runners and Cross Tees:
 - 1. All fire expansion relief cut-outs in the main runner shall be installed within 3 inches of a vertical support hanger wire.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09545

ACOUSTICAL METAL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.02 SUMMARY

A. Section Includes:

1. Metal ceiling panels.
2. Concealed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings and accessories.

B. Related Sections:

1. Section 09511 – Suspended Acoustical Ceilings
2. Section 09260 - Gypsum Board Assemblies
3. Division 15 Sections - HVAC
4. Division 16 Sections - Electrical Work

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability"
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.
- B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part 3, Installation.
- C. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- D. Shop Drawings: Details of ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings and edge details.
- E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC and AC.
- F. If the material supplied by the acoustical subcontractor does not have a Factory Mutual classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide ceiling panel units, grid components, and accessories by a single manufacturer.
- B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.
 - 1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
 - a. Flame Spread: 25 or less
 - b. Smoke Developed: 50 or less
- C. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store the ceiling panels in a dry, interior location and keep in cartons prior to installation to avoid damage. The cartons shall be stored in a vertical position. Proper care should be taken when handling to avoid damage or soiling.
- B. Exercise care in moving and opening cartons to prevent damage to the panel face.

1.07 PROJECT CONDITIONS

- A. Space Enclosure: HumiGuard Plus Ceilings: Building areas to receive ceilings shall be free of construction dust and debris. Products with HumiGuard Plus performance and hot-dipped galvanized steel, aluminum or stainless steel suspension systems can be installed up to 120°F (49°C) and in spaces before the building is enclosed, where HVAC systems are cycled or not operating. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the ceiling.

1.08 WARRANTY

- A. Ceiling Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:
1. Ceiling Panels: Sagging and warping
 2. Grid System: Rusting and manufacturer's defects.
- B. Warranty Period:
1. Ceiling panels: One (1) year from date of substantial completion.
 2. Grid: Ten (10) years from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.09 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Ceiling Panels:
1. Armstrong World Industries, Inc.: www.armstrong.com
 2. USG Corporation: www.usg.com
 3. Hunter Douglas Contract: www.hunterdouglascontract.com

2.02 METAL CEILINGS PANELS

A. Metal Ceiling Panels:

1. Surface Texture: Smooth Perforated
2. Composition: Metal
3. Color: Gun Metal Grey
4. Size: 24in X 24in
5. Edge Profile: Beveled Concealed for interface with compatible grid.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.65.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 38
8. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton.
9. Flame Spread: ASTM E 1264; Class A (FM)
10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.61.
11. Dimensional Stability: Standard .
12. Basis of Design Product: MetalWorks Concealed Beveled Clip-In, 9337U6A2WH, as manufactured by Armstrong World Industries.

B. Accessories: Fiberglass infill.

2.03 SUSPENSION SYSTEMS

A. Components: Shall be commercial quality hot dipped galvanized steel as per ASTM A 653.

1. MPT 4500 Main Beam
2. S45 Main Beam Splice
3. B4 Wire Clip for attachment to 1-1/2" carrying channel

B. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, prestretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

C. Edge Moldings and Trim:

1. Cut Perimeter Panel Installation:
 - a. C Channel #7831
 - b. Spreader Channel #7830SC

PART 3 - EXECUTION

3.01 EXAMINATION

- #### **A. Do not proceed with installation until all wet work such as concrete, plastering and painting has been completed and thoroughly dried out.**

3.02 PREPARATION

- #### **A. Measure each ceiling area and establish layout of ceiling units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at**

borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.03 INSTALLATION

- A. Install suspension system and panels in compliance with ASTM C636, with the authorities having jurisdiction, and in accordance with the manufacturer's installation instructions.
- B. Indirect-hung: Install main beams 2' on center and attached to 1-1/2" by 16 gauge carrying channel on 4' centers using the B4 wire clip.
- C. Install channel moldings at intersection of suspended ceiling and vertical surfaces per installation instructions.

3.04 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient sheet flooring.
- B. Resilient tile flooring.
- C. Resilient base.
- D. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2008b.
- B. ASTM F 710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2008.
- C. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile; 2004.
- D. ASTM F 1861 - Standard Specification for Resilient Wall Base; 2008.
- E. ASTM F 2034 - Standard Specification for Sheet Linoleum Floor Covering; 2008.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2006.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plan.
- D. Verification Samples: Submit three samples, 12x12 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 50 square feet of each type and color.
 - 3. Extra Wall Base: 100 linear feet of each type and color.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 SHEET FLOORING

- A. Linoleum Sheet Flooring: Homogeneous wear layer bonded to backing, with color and pattern through wear layer thickness:
 - 1. Minimum Requirements: Comply with ASTM F 2034, Type corresponding to type specified.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 3. Backing: Jute fabric.
 - 4. Wear Layer Thickness: 0.100 inch, minimum, excluding backing.
 - 5. Sheet Width: 78 inch, minimum.
 - 6. Pattern: Marbleized.
 - 7. Color: As shown on drawings.
 - 8. Seams: Heat welded.
 - 9. Manufacturers:
 - a. Johnsonite: www.johnsonite.com
 - b. Armstrong World Industries, Inc: www.armstrong.com.
 - c. Forbo Linoleum, Inc: www.forbo-industries.com.
 - d. Tarkett Inc: www.tarkett.com.
 - e. Substitutions: See Section 01600 - Product Requirements.
- B. Linoleum Welding Rod: Solid color linoleum produced by flooring manufacturer for heat welding seams, in color in color matching predominant flooring color.

2.02 TILE FLOORING

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness, and:
 - 1. Minimum Requirements: Comply with ASTM F 1066, of Class corresponding to type specified.
 - 2. Size: 12 x 12 inch.
 - 3. Thickness: 0.125 inch.
 - 4. Pattern: Marbleized.
 - 5. Manufacturers:
 - a. Armstrong World Industries, Inc: www.armstrong.com.
 - b. Mannington Mills, Inc: www.mannington.com.
 - c. Tarkett Inc: www.tarkett.com.
 - d. Substitutions: See Section 01600 - Product Requirements.

2.03 RESILIENT BASE

- A. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove, and as follows:
 - 1. Height: 4 inch.
 - 2. Thickness: 0.125 inch thick.
 - 3. Finish: Satin.
 - 4. Length: Roll.
 - 5. Color: Color as selected from manufacturer's standards.
 - 6. Manufacturers:
 - a. Burke Flooring: www.burkemercer.com.
 - b. Johnsonite, Inc: www.johnsonite.com.
 - c. Roppe Corp: www.roppe.com.
 - d. Substitutions: See Section 01600 - Product Requirements.

2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

- B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
- C. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- C. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare sub-floor surfaces as recommended by flooring and adhesive manufacturers.
- B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is cured.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns carefully at seams.
- B. Double cut sheet at seams.
- C. Lay flooring with tightly butted seams, without any seam sealer unless otherwise indicated.
- D. Finish seams in linoleum by heat welding.

3.05 TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

3.06 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.07 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.

3.08 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09680

CARPET

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet, direct-glued.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied carpet.
- B. Section 09685 - Carpet Tile.

1.03 REFERENCE STANDARDS

- A. ASTM D 2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006.
- B. ASTM F 710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2008.
- C. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- D. CRI 104 - Standard for Installation of Commercial Textile Floorcovering Materials; Carpet and Rug Institute; 2002.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate seaming plan, method of joining seams, direction of carpet pile and pattern, location of edge moldings and edge bindings.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit two samples 24x24 inch in size illustrating color and pattern for each carpet and cushion material specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional requirements.
 - 2. Extra Carpet: 240 sq ft of each type, color, and pattern installed.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing carpet with minimum three years experience and approved by manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.

- C. Ventilate installation area during installation and for 72 hours after installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carpet:
 - 1. Shaw Contract Group: www.shawcontractgroup.com
 - 2. Mohawk: www.mohawkflooring.com
 - 3. Patcraft Designweave: www.patcraftdesignweave.com
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 CARPET

- A. Carpet: Tufted, nylon, conforming to the following criteria:
 - 1. Surface Flammability Ignition: Pass ASTM D 2859 (the "pill test").
 - 2. Roll Width: 12 ft.
 - 3. Stitches: 11 per inch.
 - 4. Pile Weight: 30 oz/sq yd.
 - 5. Primary Backing:
 - a. Material: thermoplastic polyolefin.
 - b. Weight: 78 oz/sq yd.
 - 6. Secondary Backing:
 - a. Material: Broadloom.

2.03 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by carpet manufacturer.
- B. Moldings and Edge Strips: Embossed aluminum, color as selected.
- C. Adhesives - General: Compatible with materials being adhered; maximum VOC content as specified in Section 01616.
- D. Seam Adhesive: Recommended by manufacturer.
- E. Contact Adhesive: Compatible with carpet material; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive carpet.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub floor surfaces.
- C. Verify that concrete sub-floor surfaces are dry enough and ready for adhesive installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

- C. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Install carpet in accordance with manufacturer's instructions and CRI 104.
- D. Verify carpet match before cutting to ensure minimal variation between dye lots.
- E. Lay out carpet and locate seams in accordance with shop drawings:
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
 - 4. Locate change of color or pattern between rooms under door centerline.
 - 5. Provide monolithic color, pattern, and texture match within any one area.
- F. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

3.04 DIRECT-GLUED CARPET

- A. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.
- B. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
- C. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
- D. Roll with appropriate roller for complete contact of adhesive to carpet backing.
- E. Trim carpet neatly at walls and around interruptions.
- F. Complete installation of edge strips, concealing exposed edges.

3.05 CLEANING

- A. Remove excess adhesive from floor and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09685

CARPET TILE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Section 03300 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors.
- B. Section 09680 - Carpet: Broadloom carpet.

1.03 REFERENCE STANDARDS

- A. ASTM D 2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006.
- B. ASTM F 710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2008.
- C. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- D. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit three carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- E. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing carpet approved by manufacturer.

1.06 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Interface, Inc: www.interfaceinc.com.
 - 2. Milliken & Company: www.milliken.com.
 - 3. Shaw Contract Group: www.shawcontractgroup.com.

4. Substitutions: See Section 01600 - Product Requirements.

2.02 MATERIALS

- A. Carpet Tile: Tufted, manufactured in one color dye lot.
 1. Basis of Design Products: As indicated in the drawings.
 2. Tile Size: 24x24 or 19.69x19.69 inch, nominal.
 3. Thickness: .21 inch minimum.
 4. Color: As indicated on the drawings.
 5. Pattern: As indicated on the drawings.
 6. Surface Flammability Ignition: Pass ASTM D 2859 (the "pill test").
 7. Max. Electrostatic Charge: 3.5 Kv. max. at 20 percent relative humidity.
 8. Pile Weight: 28 oz/sq yd minimum.

2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Edge Strips: Rubber, color as selected.
- C. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09720

WALL COVERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall covering and borders.

1.02 RELATED REQUIREMENTS

- A. Section 09900 - Paints and Coatings: Preparation and priming of substrate surfaces.

1.03 REFERENCE STANDARDS

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Samples: Submit two samples of wall covering, 12x12 inch in size illustrating color, finish, and texture.
- D. Test Reports: Indicate verification of flame and smoke ratings, when tested by UL.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- F. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Wall Covering Materials: 25 linear feet of each color and pattern of wall covering; store where directed.
 - 3. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:

1. Koroseal/RJF International: www.koroseal.com.
2. MDC Wallcoverings: www.mdcwall.com.
3. Wolf Gordon: www.wolf-gordon.com
4. Maharam: www.maharam.com
5. Substitutions: See Section 01600 - Product Requirements.

2.02 MATERIALS

- A. Requirements for All Wall Coverings:
 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84.
- B. Wall Covering: Vinyl coated fabric roll stock, conforming to the following:
 1. Total Weight: 20 oz/sq yd.
 2. Roll Width: 54 inches.
 3. Color: As scheduled on the drawings.
 4. Pattern: As scheduled on the drawings.
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- D. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and conform to requirements of the wall covering manufacturer.
- B. Measure moisture content of surfaces using an electronic moisture meter. Do not apply wall coverings if moisture content of substrate exceeds level recommended by wall covering manufacturer.
- C. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.02 PREPARATION

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces that affect work of this section.
- E. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Apply adhesive to wall surface immediately prior to application of wall covering. Let contact adhesive set tack free.
- C. Razor trim edges on flat work table. Do not razor cut on gypsum board surfaces.
- D. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tightly.
- E. Horizontal seams are not acceptable.

- F. Do not seam within 2 inches of internal corners or within 6 inches of external corners.
- G. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- H. Do not install wall covering more than 1/4 inch below top of resilient base.
- I. Cover spaces above and below windows, above doors, in pattern sequence from roll.
- J. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.04 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

END OF SECTION

SECTION 09721

PRESENTATION DRY ERASE WALLCOVERING

PART 1 – GENERAL

1.01 SUMMARY

A. Division Includes:

1. Dry Erase Wallcovering.
2. Tray, Trim, and Presentation Rails.
3. Accessories.

B. Related Divisions:

1. Division 09260 Gypsum Board Assemblies: Wall substrate.
2. Division 09900 Paints and Coatings: Priming for vinyl wall coverings.
3. Division 09720 Wall Covering.

1.02 REFERENCES

- A. ASTM E84; **2004**: Test Method for Surface Burning Characteristics of Building Materials.
- B. Gypsum Association GA-14-M-97: Recommended Levels of Gypsum Board Finish.

1.03 SUBMITTALS

- A. Manufacturer's product data and installation instructions for each type of dry erase wallcovering, adhesive, and accessories required.
- B. Manufacturer's written product data indicating compliance with specified materials required.
- C. Manufacturer's written installation instructions.
- D. Manufacturer's written instructions for recommended maintenance of each type of dry erase wallcovering required.
- E. Samples:
1. 7 x 9 inch (18 x 23 centimeter) samples of each dry erase material required.
 2. 6 inch (15 centimeter) samples of trim, tray, and end caps required.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Provide each type of dry erase wallcovering required produced by one manufacturer.
- B. Installer: Installation by skilled commercial wallcovering contractor approved by the manufacturer.
- C. Composition:
1. Provide non-woven, pigmented white vinyl, capped with dry erase low gloss film.

- D. Flame Spread/Smoke Developed Classification: Provide materials that meet Class A rating when tested in accordance with ASTM E84 for flame spread and smoke developed.
 - 1. Maximum flame spread: 25
 - 2. Maximum smoke developed: 450

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver presentation wallcoverings to the project site in unbroken and undamaged original
- B. factory packaging and clearly labeled with the manufacturer's identification label, quality or grade, and lot number.
- C. Store materials in a clean, dry storage area with temperature maintained above 55° F (13° C) with normal humidity.
- D. Store material within original packaging to prevent damage.

1.06 PROJECT CONDITIONS

- A. Do not apply presentation wallcoverings when surface and ambient temperatures are outside the temperature ranges required by the wallcovering manufacturer.
- B. Provide continuous ventilation and heating facilities to maintain substrate surface and ambient temperatures above 55° F (13° C) unless required otherwise by manufacturer's instructions.
- C. Apply adhesive when substrate surface temperature and ambient temperature is above 55° F (13° C) and relative humidity is below forty percent.
- D. Maintain constant recommended temperature and humidity for at least seventy-two hours prior to and throughout the installation period, and for seventy-two hours after wallcovering installation completion.
- E. Provide not less than 80-foot-candles per square foot lighting level measured mid-height at substrate surfaces.

1.07 WARRANTY

- A. Submit manufacturer's limited five-year written warranty against manufacturing defects.

1.08 MAINTENANCE

- A. Maintenance instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Walltalkers Wallcoverings: www.walltalkers.com
- B. Speak Easy Dry Erase Wallcoverings: www.speakeasydryerase.com

C. MarkaWall: www.markawall.com

2.02 MATERIALS

A. Smooth low gloss vinyl surface for projection and dry erase markers.

1. 49/50 inch (124/127 centimeter) width, 18 ounce per square yard (.61 kilogram per square meter), non-woven backing, white.

2.03 TRIM, TRAY, AND PRESENTATION RAILS

A. Aluminum Tray:

1. Clear satin, anodized aluminum, snap-on marker and eraser tray with clips. Tray is to extend within 1'-0" of side walls. Use longest lengths available.

B. End Caps:

1. ET03-00: 1/2 inch (13 millimeter) anodized tray end cap set for marker and eraser tray.

2.04 ACCESSORIES

A. Adhesives: Heavy-duty clear or clay based premixed vinyl adhesive.

B. Substrate Primer/Sealer: White pigmented acrylic base primer/sealer specifically formulated for use with vinyl wallcoverings.

C. Presentation Starter Kit: Provide one starter kit containing eight dry erase Markers (minimum 4 colors), two erasers, ten cleaning towels, and one 8 ounce (.23 kilogram) bottle liquid surface cleaning solution for each room installed with dry erase wallcovering.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and installation conditions to ensure surface conditions meet or exceed a Level 4 finish, per GA-214-M-97: Recommended Levels of Gypsum Board Finish, and permanent lighting should be installed and operational.
- B. Test substrate with a suitable moisture meter and verify that moisture content does not exceed four percent.
- C. Verify substrate surface is clean, dry, smooth, structurally sound, and free from surface defects and imperfections that would show through the finished surface.
- D. Evaluate all painted surfaces for the possibility of pigment bleed-through.
- E. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.
- F. Beginning of installation means acceptance of surface conditions.

3.02 INSTALLATION

PRESENTATION DRY ERASE WALLCOVERING
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- A. Acclimate wallcovering in the area of installation a minimum of twenty-four hours before installation.
- B. Read and follow the manufacturer's installation instruction sheet contained in each roll of the dry erase wallcovering.
- C. Examine all materials for pattern, color, quantity and quality, as specified for the correct location prior to cutting.
- D. Adhesive: Apply a uniform coat of heavy-duty pre-mixed clay-based or extra strength clear wallcovering adhesive.
- E. Primer: Use a quality pigmented acrylic wallcovering primer.
- F. Install each strip horizontally and in the same sequence as cut from the roll.
- G. Install dry erase wallcovering sheets in exact order as they are cut from bolt. Reverse hang alternate strips (except lined products). Do not crease or bend the wallcovering when handling.
- H. Install dry erase wallcovering horizontally using a level line.
- I. Using a level or straight edge, double cut the seam with a seam-cutting tool (Ex: Double Seam-Cutter or Swedish Knife). Do not score drywall or plasterboard when cutting material.
- J. When covering the entire wall, seam the material out of the main writing and viewing areas of the wall.
- K. Apply wallcovering to the substrate using a wallcovering smoother, wrapped with a soft cloth, to remove air bubbles. Do not use sharp edged smoothing tools. Smooth material on the wall from the middle to the outside edge.
- L. Remove excess adhesive immediately after the wallcovering is applied. Clean entire surface with a warm mild soap solution, and clean soft cloths. Rinse thoroughly with water and let dry before using. Change water often to maintain water clarity.
- M. Stop installation of material that is questionable in appearance and notify the manufacturer's representative for an inspection.

3.03 CLEAN-UP

- A. Upon completion of installation, remove all exposed adhesive immediately using a soft cloth and a warm, mild soap solution and rinse thoroughly with water and dry with clean towel prior to using.
- B. Upon completion of the work, remove surplus materials, rubbish, and debris resulting from the wallcovering installation. Leave areas in neat, clean, and orderly condition.

END OF SECTION

PRESENTATION DRY ERASE WALLCOVERING
Rappahannock Community College Renovation
Glenns and Warsaw, Virginia

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SECTION 09726

TACKABLE WALLCOVERING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Resilient cork/linoleum tackable wallcovering.
2. Accessories.

B. Related Divisions:

1. Division 09900 Paints and Coatings: Priming for wallcoverings.

1.02 SUBMITTALS

A. Comply with Division 01300.

B. Product data indicating compliance with specified requirements.

C. Installation Instructions.

D. Samples: 7 x 9 inch (18 x 23 centimeter) samples of each type of tackable wallcovering material required.

1.03 REFERENCES

- A. ASTM E84; 2004: Test Method for Surface Burning Characteristics of Building Materials.**

1.04 QUALITY ASSURANCE

A. Flame Spread/Smoke Developed Classification: Provide materials that meet Class B rating when tested in accordance with ASTM E84-2004 for Flame Spread and Smoke Developed.

1. Maximum Flame Spread: 75
2. Maximum Smoke Developed: 450

B. Single Source Responsibility: Obtain tackable wallcovering system components from a single source.

C. Deliver materials in original factory packaging, labeled with manufacturer, brand name, size, color, and lot number.

D. Store materials in original, undamaged packaging inside a well-ventilated area protected from weather, moisture, soiling, and extreme temperatures. Maintain room temperature within the storage area at not less than 68° F (20° C) during the period materials are stored.

1.04 PROJECT CONDITIONS

- A. Maintain ambient temperature within the building at not less than 68° F (20° C) for a minimum of seventy-two hours prior to beginning of installation.
 - 1. Do not install tackable wallcovering until the space is enclosed and weatherproof.
 - 2. Do not install tackable wallcovering until temperature is stabilized and permanent lighting is in place.

1.05 MAINTENANCE

- A. Maintenance Instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

1.06 WARRANTY

- A. Submit manufacturer's limited five-year written warranty against manufacturing defects.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Resilient, tackable, linoleum surface material. Width: 48 inch (122 centimeter). Gauge: 1/4 inch (6 millimeter). Approximately $\pm$ 95 lineal foot (28.92 meter) rolls. Flexible enough to bend around a 2-3/4 inch (7 centimeter) radius. Dimensionally stable due to burlap backing.

2.02 ACCESSORIES

- A. Adhesive: Solvent-free, SBR type linoleum adhesive (L-910) or polyvinyl acetate dispersion type (contact adhesive) when used in a press.
- B. Color matched caulk: Acrylic sealant, color to match tack board.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions in which tackable wallcoverings will be installed.
- B. Complete finishing operations, including painting, before beginning installation of tackable wallcovering materials.
- C. Wall surfaces to receive wallcovering materials shall be dry and free from dirt, grease, loose paint, and scale.
- D. Notify the contractor and architect in writing of any conditions detrimental to the proper and timely completion of the installation.
- E. Beginning of installation means acceptance of surface conditions.

3.02 PREPARATION

- A. Surface Preparation: Remove hardware, accessories, plates, and similar items to allow tackable wallcovering to be installed.
 - 1. Gypsum board surface: Recess nails and screws. Repair irregular tape joints, sand and remove dust.
 - 2. Painted surface: Remove loose paint or scale. Sand surface of enamel or gloss paint and wipe clean with damp cloth.
 - 3. Ensure wall surfaces scheduled to receive tackable wallcovering are properly sealed with a quality primer specified for use under flexible vinyl wallcoverings.

3.03 APPLICATION

- A. Comply with manufacturer's printed installation instructions.
- B. Cut sheets to size including a few inches of overage. Allow sheets to lay flat for at least twenty four hours prior to the application. Mark roll direction and sequence on the backside of each sheet. Hang sheets in sequence as cut from the roll, do not reverse sheets.
- C. Permanent HVAC system should be set to 68° F (20° C) for at least seventy-two hours prior to, during, and after the installation.
- D. Back roll each sheet prior to the installation to release curl memory.
- E. For seamed applications, using a seam and strip cutter remove the factory edge of one sheet. Using the same tool, overlap and trace cut the mating edge of the second sheet. Repeat this step for as many sheets as required for the job.
- F. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.
- G. Apply adhesive with a 1/16 inch square notch trowel to the area to receiving the sheet (apply enough for one sheet at a time).
- H. Work from top to bottom then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.
- I. Remove adhesive residue immediately after each panel is hung with a mild soap/water solution and a soft cloth/sponge.
- J. Clean wallcovering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.
- K. It is important to remove adhesive while wet.

3.04 PROTECTION

- A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

SECTION 09841

SOUND ABSORPTIVE CANOPIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Acoustical canopies
 - 2. Cable hangers and fasteners
- B. Related Sections:
 - 1. Section 09511 – Suspended Acoustical Ceilings
 - 2. Section 09260 – Gypsum Board Assemblies
 - 3. Division 15 Sections - HVAC
 - 4. Division 16 Sections - Electrical

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 423: Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 2. ASTM E 84; 2004: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E 1477: Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- B. International Code Council Evaluation Service
AC156 - Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of canopy system required.
- B. Installation Instructions: Submit manufacturer's installation instructions.
- C. Shop Drawings: Layout and details of canopies. Show locations of items which are to be coordinated with canopies.
- D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide canopies and method of attachment by a single manufacturer.

- B. Coordination of Work: Coordinate canopy work with installers of related work including, but not limited to suspended ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
- C. Seismic Performance: System seismic performance verified through full-scale testing in accordance with ICC-ES – AC-156 Acceptance Criteria for Seismic Qualification Testing of Non-Structural components.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver canopies to project site in original, unopened packages and store them in a fully enclosed space below 100°F (38°C) where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing canopies, permit them to reach room temperature and a stabilized moisture content.
- C. Handle canopies carefully to avoid damaging units in any way.

1.07 PROJECT CONDITIONS

- A. Space Enclosure:
Building areas to receive canopies shall be free of construction dust and debris. Products can be installed up to 100°F (38°C) with humidity not exceeding 90% RH. Cannot be used in exterior applications where standing water is present or where moisture will come in direct contact with the canopy. Following installation, conditions must be maintained below 70% RH.

1.08 WARRANTY

- A. Acoustical canopy: Submit a written warranty executed by the manufacturer, agreeing to repair or replace canopies that fail within the warranty period. Failures include, but are not limited to:
 - 1. Canopies: Manufacturing defects.
 - 2. Attachment devices: Rusting and manufacturing defects.
- B. Warranty Period:
 - 1. Canopies: One (1) year from date of substantial completion.
 - 2. Attachment devices: One (1) year from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Canopies:
 - 1. Armstrong World Industries, Inc.
 - 2. USG Corporation: www.usg.com
 - 3. Hunter Douglas Contract: www.hunterdouglascontract.com
- B. Attachment devices:
 - 1. Armstrong World Industries, Inc.
 - 2. USG Corporation: www.usg.com
 - 3. Hunter Douglas Contract: www.hunterdouglascontract.com

2.02 CANOPY UNITS

- A. Canopy:
 - 1. Surface Texture: Smooth
 - 2. Composition: Wet formed mineral fiber
 - 3. Surface finish: Acoustically transparent membrane on all sides and edges
 - 4. Color: White
 - 5. Size: 46-1/2 inches x 75 inches
 - 6. Thickness: 1-1/4 inch
 - 7. Edge Detail: Square edge
 - 8. Panel Configuration: Concave
 - 9. Arc Radius: 10 feet 9 inches
 - 10. Flame Spread/Smoke Developed: (ASTM E 84), Class A
 - a. Maximum Flame Spread: 25
 - b. Maximum Smoke Developed: 450
 - 11. Light Reflectance: (LR): (ASTM E 1477), Minimum 0.86
 - 12. Acoustical Absorption: (ASTM C423), Minimum 30 Sabin/panel
 - 13. Mold/Mildew Inhibitor: The surface and back of the product have been treated with BioBlock, a paint that contains a special biocide that inhibits or retards the growth of mold and mildew, ASTM D3273.
 - 14. Basis of Design Product: SoundScapes Acoustical Canopy Hill, manufactured by Armstrong World Industries.

2.03 ATTACHMENT SYSTEM

- A. Installation Hardware
 - 1. Hardware is partially embedded with little visible support mechanisms.
 - 2. Cables and components for attachment to support are available to coordinate with the canopy package.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Measure each ceiling area and establish layout of canopies. Comply with reflected ceiling plans. Coordinate panel layout with mechanical, electrical and sprinkler fixtures.

3.02 INSTALLATION

- A. Install canopies in accordance with the manufacturer's instructions and in compliance with the authorities having jurisdiction.

3.03 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of canopies per manufacturer's instructions.

END OF SECTION

SECTION 09843

ACOUSTICAL CEILING CLOUDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Acoustical clouds
 - 2. Attachment hangers and fasteners
- B. Related Sections:
 - 1. Section 09511 – Suspended Acoustical Ceilings
 - 2. Section 09260 – Gypsum Board Assemblies
 - 3. Division 15 Sections - HVAC
 - 4. Division 16 Sections - Electrical

1.03 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C 423: Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 2. ASTM E 84; 2004: Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E 1477: Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- B. 2006 Virginia Uniform Statewide Building Code

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data for each type of cloud system required.
- B. Installation Instructions: Submit manufacturer's installation instructions.
- C. Shop Drawings: Layout and details of acoustical clouds. Show locations of items which are to be coordinated with acoustical clouds.
- D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide acoustical clouds and method of attachment by a single manufacturer.

- B. Coordination of Work: Coordinate acoustical cloud work with installers of related work including, but not limited to suspended ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
- C. Seismic Performance: The VUSBC allows architectural components to swing freely as long as they will not be damaged or cause damage. Acoustical Clouds suspended individually with aircraft cable will swing no more than 18 inches in any direction for each panel. Shapes direct attached to drywall or suspended in group systems have been engineered for application in all seismic areas.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical clouds to project site in original, unopened packages and store them in a fully enclosed space between 40°F (4° C) and 120°F (49° C) where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes. All wet work (plastering, concrete, etc) must be complete and dry.
- B. Before installing acoustical clouds, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical clouds carefully to avoid damaging the surface and edges in any way.

1.07 PROJECT CONDITIONS

- A. Space Enclosure:
Building areas to receive acoustical clouds shall be free of construction dust and debris. Products can be installed in temperatures between 40°F (4° C) and 120°F (49° C). Cannot be used in exterior applications, where standing water is present, or where moisture will come in direct contact with the acoustical cloud.

1.8 WARRANTY

- A. Acoustical Clouds: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical clouds that fail within the warranty period. Failures include, but are not limited to:
 - 1. Acoustical clouds: Manufacturing defects.
 - 2. Attachment devices: Rusting and manufacturing defects.
- B. Warranty Period:
 - 1. Acoustical Clouds: One (1) year from date of substantial completion.
 - 2. Attachment devices: One (1) year from date of substantial completion.
- C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acoustical Clouds:
 - 1. Armstrong World Industries, Inc.: www.armstrong.com
 - 2. USG Corporation: www.usg.com
 - 3. Hunter Douglas Contract: www.hunterdouglascontract.com
- B. Attachment devices:
 - 1. Armstrong World Industries, Inc. : www.armstrong.com

2. USG Corporation: www.usg.com
3. Hunter Douglas Contract: www.hunterdouglascontract.com

2.02 ACOUSTICAL CLOUD UNITS

- A. Acoustical Cloud:
 1. Surface Texture: Smooth
 2. Composition: Fiberglass
 3. Surface finish: Acoustically transparent membrane on front and edges
 4. Color: White
 5. Shapes:
 - a. Nominal 4 foot x 6 foot Shape, Small Rectangle
 6. Thickness: 7/8 inch
 7. Edge Detail: Square edge
 8. Flame Spread/Smoke Developed: (ASTM E 84), Class A
 - a. Maximum Flame Spread: 25
 - b. Maximum Smoke Developed: 450
 9. Light Reflectance: (LR): (ASTM E 1477), White: 0.90
 10. Acoustical Absorption: (ASTM C423), White: Minimum 1.17 Sabins/sf
 11. Antimicrobial protection: Inherent - Resists the growth of mold/mildew and bacterial growth.
 12. Basis of Design Product: SoundScapes Shapes, Item #5448, as manufactured by Armstrong World Industries.

2.03 ATTACHMENT SYSTEMS

1. Installation Hardware Kits for individual and group suspension as required by the manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical clouds and installation hardware. Comply with reflected ceiling plans. Coordinate panel layout with mechanical, electrical and sprinkler fixtures.

3.02 INSTALLATION

- A. Install panels in accordance with the manufacturer's instructions and in compliance with the authorities having jurisdiction.

3.03 ADJUSTING AND CLEANING

- A. Replace damaged and broken panels.
- B. Clean exposed surfaces of acoustical clouds per manufacturer's instructions.

END OF SECTION

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints, stains, varnishes, and other coatings.
- C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
 - 2. Prime surfaces to receive wall coverings.
 - 3. Mechanical and Electrical:
 - a. In exposed above ceiling areas, paint all insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
 - b. In finished areas, paint shop-primed items.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne, and lead items.
 - 6. Floors, unless specifically so indicated.
 - 7. Ceramic and other tiles.
 - 8. Exterior insulation and finish system (EIFS).
 - 9. Glass.
 - 10. Acoustical materials, unless specifically so indicated.
 - 11. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

- A. Section 05500 - Metal Fabrications: Shop-primed items.
- B. Section 09960 - High-Performance Coatings.
- C. Section 13040 - Above Ground Storage Tanks: Painting inside and outside of tanks.

1.03 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

- D. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Coatings: 2 gallons of each color; store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products from the same manufacturer to the greatest extent possible.
- B. Paints:
 - 1. Duron, Inc: www.duron.com.
 - 2. ICI Paints: www.icipaintsinna.com.
 - 3. Benjamin Moore & Co: www.benjaminmoore.com.
 - 4. PPG Architectural Finishes, Inc: www.ppgaf.com.
- C. Substitutions: See Section 01600 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.

4. Supply each coating material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Colors: As indicated on drawings
1. In exposed above-ceiling areas at non-mechanical rooms, finish pipes, ducts, conduit, and equipment black.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint ME-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
 2. Gloss: Two coats of alkyd enamel.
- B. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
 2. Gloss: Two coats of alkyd enamel.
- C. Paint MaE-OP-3A - Aluminum and Copper, Unprimed, Alkyd, 3 Coat:
1. One coat etching primer.
 2. Gloss: Two coats of alkyd enamel.

2.04 PAINT SYSTEMS - INTERIOR

- A. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
1. One coat of block filler.
 2. Semi-gloss: Two coats of latex enamel; bathrooms and wet areas.
 3. Eggshell: Two coats of latex enamel; Unless noted otherwise.
- B. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of latex primer.
 2. Semi-gloss: Two coats of latex enamel.
- C. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with latex primer.
 2. Semi-gloss: Two coats of latex enamel.
- D. Paint Mgl-OP-3L - Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer.
 2. Gloss: Two coats of latex enamel.
- E. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
1. One coat of latex primer sealer.
 2. Semi-gloss: Two coats of latex enamel; bathrooms and wet areas.
 3. Eggshell: Two coats of latex enamel; Unless noted otherwise.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of coatings until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Plaster and Stucco: 12 percent.
 - 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 4. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing coatings that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- H. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- I. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- J. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- K. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-PC 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

- L. Uncorroded Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by hand or power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.
- M. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
- N. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.
- O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's instructions.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Touch-up damaged coatings after Substantial Completion.

END OF SECTION

SECTION 09960

HIGH PERFORMANCE COATINGS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.02 SUMMARY

- A. Scope: Provide labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and application for high performance coatings as required for the complete performance of the work, and as shown on the Drawings and as herein specified.
 - 1. This product shall meet or exceed this criteria. Paint shall contain anti-microbial to inhibit the growth of mold, mildew, and bacterial from setting up on the dried paint film. The product shall meet or exceed 8000 scrub cycles on the ASTM D 2486 test.
- B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:
 - 1. Surface preparation.
 - 2. Water-based two-component polyurethane-fortified paint finish system.
- C. Related Sections: Related sections include, but shall not be limited to, the following:
 - 1. Section 03300 - Cast-in-Place Concrete.
 - 2. Section 04810 - Unit Masonry Assemblies.
 - 3. Section 09260 - Gypsum Board Assemblies.

1.03 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
- B. ASTM (ASTM)
 - 1. ASTM D 1308, "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes."
 - 2. ASTM D 2486, "Standard Test Method for Scrub Resistance of Interior Latex Flat Wall Paints."
 - 3. ASTM D 2794, "Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)."
 - 4. ASTM E 84-2004, "Standard Test Method for Surface Burning Characteristics of Building Materials."

C. Painting and Decorating Contractors of America (PDCA):

1. PDCA P5, "Benchmark Sample Procedures for Paint and Other Decorative Coating Systems."

D. South Coast Air Quality Management District (SCAQMD):

1. SCAQMD Rule #1168, "Adhesive and Sealant Applications," including most recent amendments.

1.04 SYSTEM DESCRIPTION

A. Performance:

1. VOC: Coatings shall have less than 50 g/l of VOC's.
2. Fire Rating: Coatings shall be Class A fire-rated, ASTM E 84.
3. Scrub Test: Greater than 3500 cycles, ASTM D 2486.
4. Impact Resistance: Greater than 60 in/lbs, ASTM D 2794.
5. Chemical Resistance: 10 (test maximum) for all chemicals tested, ASTM D 1308.
6. Finish: 10 percent to 15 percent gloss at 60 degrees.
7. Stain Removal: 8 to 10 (test maximum) for all stains tested, four-hour Open Spot Test.

1.05 SUBMITTALS

A. General: See Section 01300 – Administrative requirements, for submittal procedures.

B. Product Data: Submit product data showing material proposed. Submit sufficient information to determine compliance with the Drawings and Specifications. Product data shall include, but shall not be limited to, manufacturer's product data and application instructions.

1. Submit written proof of approval by the manufacturer and written acknowledgement that equipment to be used is approved by finish system manufacturer.

C. Finish Samples:

1. Sample Card: Submit six sample cards indicating manufacturer's standard selection of finish colors.
2. Samples: Submit four 4 inch (102 mm) by 5 inch (127 mm) samples of cardboard with specified or selected finish colors.
3. Control Samples: Submit two samples of each finish color to ensure ability to reproduce selected finishes.

D. Quality Control Submittals: Submit letter from manufacturer stating that applicator has completed manufacturer's training program.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of decorative finishes of types and sizes required.
 - a. All materials within special coatings section including, but not limited to, finishes, and primers shall be supplied by one manufacturer.
2. Applicator Qualifications: Applicator shall be approved by the manufacturer.
 - a. Applicator shall certify in writing that technicians utilized for work in this Section have been trained by the manufacturer or its representative.

- b. Applicator shall include in his certification that specialized equipment as required by the manufacturer shall be used for work in this Section.
- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01600 - Project Requirements.
- B. Deliver materials in unopened containers with manufacturer's labels intact.
- C. Protect materials from freezing.
- D. Store between 50 degrees F (10 degrees C) and 80 degrees F (27 degrees C).

1.08 PROJECT CONDITIONS

- A. Apply coating under following conditions:
 - 1. Temperature of air and substrate is between 50 degrees F (10 degrees C) and 80 degrees F (27 degrees C). Relative humidity shall be less than 50 percent.
 - 2. Prevent wide temperature fluctuations that could cause moisture condensation on freshly coated surfaces.
 - 3. Application areas shall be free of excessive dust.
- B. Maintain minimum 80 footcandles (861 lx) on surfaces to be coated.
- C. Provide adequate fresh air and ventilation during application.

1.09 WARRANTY

- A. General: See Section 01780 - Closeout Submittals.
- B. Special Warranty: The manufacturer shall warrant the work of this Section to be in accordance with the Contract Documents and free from faults and defects in materials for a period of five years from date of Substantial Completion. This special warranty shall extend the one year period of limitations contained in the General Conditions.
- C. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1.10 MAINTENANCE MATERIALS

- A. Extra Stock: Provide 5 gallons (18.9 l) of each base coat color used per site. Provide in sealed, labeled containers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Master Coating Technologies Scuffmaster: www.scuffmaster.com
- B. Zolatone: www.zolatone.com

HIGH PERFORMANCE COATINGS
Rappahannock Community College Renovation
Glenns and Warsaw, Virginia

09960 - 3
PC: 260-17712
5/11/2010

- C. MDC Wallcoverings: www.mdcwall.com
- D. Substitutions: See Section 01600 - Project Requirements.

1. Submit proposed substitution to the Architect no fewer than 10 days before bid date. Acceptance will be by Addendum.
2. Submit finish samples to match color of specified finishes, product data, application instructions, test reports, etc. Clearly indicate discrepancies between specified product and proposed substitution.

2.02 MATERIALS

- A. Primer: Provide primer recommended by manufacturer for substrate.
 1. Concrete and Masonry: Suitable heavy-bodied latex vinyl acrylic block filler. Provide manufacturer's recommended product if uniform base color with pores exposed is desired.
 2. Primed Metals: No primer required.
 3. Unprimed Metals: In accordance with the manufacturer's recommendations.
 4. New Gypsum Board: 100% Acrylic Interior Latex Primer recommended by the manufacturer.
- B. Finish System Components:
 1. Finish Coat: Two-component polyurethane-fortified coating and cross-linker.
 - a. Basis of Design: "Scuffmaster ScrubTough," Master Coating Technologies.
 2. Miscellaneous Materials: Surface patching compounds and other materials necessary for application of finish system shall be of high quality and compatible with coating system.

2.03 EQUIPMENT

- A. Spray or roll primers and base coats in accordance with manufacturer's instructions.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work is to be applied, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 1. Verify that substrates are ready to receive work of this Section and are in accordance with coating manufacturer's requirements. Report any conditions that would adversely affect the appearance or performance of the coating systems.
 2. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Applicator.

3.02 PREPARATION

- A. Protection: Mask adjacent surfaces to protect from overspray. Protect floors and other surfaces with drop cloths.
 1. Remove items which are not to be coated from surfaces that are to be coated. Tag and protect removed items and store until re-installation. Re-install items after completion of coating application. Items which are not to be coated include, but shall not be limited to, operating hardware, electrical device plates, and factory-finished items.

2. Patch and repair substrates as specified in applicable specifications sections. Clean substrates. Remove dirt, grit, loose materials, grease, oil, temporary protective coatings, contamination, other foreign materials, etc. Sand with 100 grit or finer sand paper, spackle, putty, and caulk existing surfaces to produce smooth and uniform substrates. Spot-prime existing water-soluble stains with alcohol or oil-based stain killing primer. Touch-up painted or primed surfaces with compatible paint or specified primer.
- B. Concrete: Remove high spots, fill holes and clean surfaces as specified in Section 03300 - Cast-In-Place Concrete. Allow new concrete to cure a minimum of 28 days prior to application of coatings.
- C. Masonry: Tool joints and clean surfaces as specified in Section 04810 - Unit Masonry Assemblies. Rinse off cleaning solutions and allow surface to dry. Allow new mortar to cure a minimum of 28 days prior to coating.
- D. Ferrous Metals: Remove rust and mill scale. Wire brush or sand damaged or rusted areas to bright metal. Remove grease and other foreign materials with mineral spirits. Touch-up damaged areas of shop primer.
- E. Aluminum: Thoroughly degrease using non-hydrocarbon solvent cleaner. Etching is recommended before priming if possible. As an alternative, use a wash primer prior to the paint application.
- F. Non-Ferrous Metals: Clean with lacquer thinner.
- G. Wood: Sand smooth and free of marks as specified in Section 06 20 00 - Finish Carpentry. Wash sap spots and knots with mineral spirits. When dry, cover spots and knots with two coats of shellac.
- H. Plaster: Allow new plaster to cure a minimum of 28 days prior to coating.
- I. Gypsum Board: Apply joint tape and compound to joints, fastener heads, dents, and surface flaws as specified in Section 09260 - Gypsum Board Assemblies. Sand smooth and flush with adjacent surfaces. Thoroughly clean sanded areas of dust with a clean damp rag.
- J. Ceramic Tile and Glazed Block: Thoroughly clean off oil, wax, grease, and other residues. De-gloss with either mechanical abrasion or chemical etch. Remove sanding dust with a clean, wet rag.
- K. Previously Painted Surfaces: De-gloss (if necessary) and re-prime previously painted substrates with manufacturer's recommended primer.

3.03 APPLICATION

- A. Applicator shall apply coatings in accordance with the 2005 Virginia State Fire Prevention Code and manufacturer's written instructions.
 1. Closets and storage areas shall be finished inside in the same manner as adjoining rooms.
 2. Finish HVAC registers and grilles and other items located in surfaces to receive coatings.
- B. Apply as many primer coats as necessary to produce a uniform substrate appearance. Do not exceed manufacturer's recommended coverage rate. Allow to dry prior to application of subsequent coats.
- C. Re-prime suction and hot spots on substrate prior to applying base coatings.

- D. Over wood and gypsum board, sand primer with 100 grit or finer sand paper. Thoroughly remove dust from sanding with a clean, wet rag.
- E. Spray or roll finish to completely cover primer and according to manufacturer's written instructions. Apply in a continuous, even film at manufacturer's specified coverage rate.
- F. Apply each coat to a natural break point such as an edge or corner without stopping.
- G. Finishes shall match approved benchmark samples and shall be free of runs, sags, holidays, and excessive irregularity/unevenness of pattern coat. Transitions between colors and/or other materials shall be sharp, clean and without overlaps.

3.04 INSPECTION

- A. Request acceptance of each coat before applying succeeding coats.
- B. Touch-up and repair unacceptable work.
- C. Protect finished areas from damage.

3.05 CLEANING

- A. Clean overspray and spills. Remove masking.
- B. Repair damage to coatings and surfaces caused by clean-up activities.

3.06 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to the Applicator, that shall ensure that the high performance coatings shall be without damage at time of Substantial Completion.

END OF SECTION

SECTION 10170

PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid plastic toilet compartments.
- B. Urinal screens.

1.02 RELATED REQUIREMENTS

- A. Section 05500 - Metal Fabrications: Concealed steel support members.
- B. Section 10800 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2004.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit three samples of partition panels, 4x4 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 GENERAL

- A. Flame Spread/Smoke Developed Classification: Provide materials that meet Class C rating when tested in accordance with ASTM E84 for Flame Spread/Smoke Developed.
 - 1. Maximum Flame Spread: 200
 - 2. Maximum Smoke Developed: 450

2.02 2.02 MANUFACTURERS

- A. Plastic Toilet Compartments:
 - 1. Ampco Products, Inc: www.ampco.com.
 - 2. Metpar Corp: www.metpar.com.
 - 3. Scranton Products (Santanta/Comtec/Capital): www.scrantonproducts.com.com.
 - 4. Substitutions: Section 01600 - Product Requirements.

2.03 COMPONENTS

- A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, ceiling-hung.
 - 1. Color: scheduled on the drawings.

- B. Door and Panel Dimensions:
 - 1. Thickness: 1 inch.
 - 2. Door Width: 24 inch.
 - 3. Door Width for Handicapped Use: 36 inch, out-swinging.
 - 4. Thickness of Pilasters: 1 inch.
- C. Urinal Screens: Wall mounted with two panel brackets minimum.

2.04 ACCESSORIES

- A. Pilaster Shoes: Formed chromed steel with satin finish, 3 in high, concealing ceiling fastenings.
 - 1. Provide ceiling attachment using two adjustable hanging studs, attached to above-ceiling framing.
- B. Wall and Pilaster Brackets: Satin stainless steel.
- C. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- D. Hardware: Satin stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Door Latch: Slide type with exterior emergency access feature.
 - 3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 4. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.
- B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10191

CUBICLE CURTAINS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface mounted overhead metal curtain track and guides.
- B. Curtains.

1.02 RELATED REQUIREMENTS

- A. Section 01100 - Summary: VCCS-installed curtains.
- B. Section 09511 - Suspended Acoustical Ceilings: Suspended ceiling system to support track.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers and suspension points, attachment details, schedule of curtain sizes.
- C. Samples: Submit 12 inch sample length of curtain track including typical splice and wall and ceiling hanger and escutcheon.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- E. Maintenance Data: Include recommended cleaning methods and materials and stain removal methods.
- F. Maintenance Materials: Furnish the following for VCCS's use in maintenance of project.
 - 1. See Section 01600 - Product Requirements, for additional provisions.
 - 2. Extra Carriers: Ten.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Accept curtain materials on site and inspect for damage.
- B. Store curtain materials on site and deliver to VCCS for installation when requested. G.C. to install.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Cubicle Curtain System:
 - 1. A. R. Nelson Co: www.arnelson.com.
 - 2. C/S General Cubicle: www.c-sgroup.com/cubicle-track-curtains.
 - 3. Imperial Fastener Co., Inc: www.imperialfastener.com.
 - 4. InPro Corporation. www.inprocorp.com
 - 5. Substitutions: See Section 01600 - Product Requirements.

2.02 TRACKS AND TRACK COMPONENTS

- A. Track: Extruded aluminum sections; one piece per cubicle track run.
 - 1. Structural Performance: Capable of supporting vertical test load of 50 lbs without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
 - 2. Track End Stop, Tees, Y's, and Switches: To fit track section.

3. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
 4. Finish on Exposed Surfaces: Clear anodized finish.
- B. Curtain Carriers: Nylon roller to accurately fit track; designed to eliminate bind when curtain is pulled; fitted to curtain to prevent accidental curtain removal; minimum 2 carriers per foot of track length.
- C. Wand: Aluminum hollow section, attached to lead carrier, for pull-to-close action.

2.03 CURTAINS

- A. All Curtain Materials:
1. Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E 84.
 2. Naturally flame resistant or flameproofed; capable of passing NFPA 701 test.
- B. Curtain: Close weave nylon; anti-bacterial, self deodorizing, sanitized, and preshrunk.
- C. Curtain;; color selected from manufacturer's standard range.
- D. Open Mesh Cloth: Open weave to permit air circulation; flameproof material, same color as curtain.
- E. Curtain Fabrication:
1. Manufacture curtains of one piece, sized 10 percent wider than track length. Terminate curtain 15 inches from floor.
 2. Include open mesh cloth at top 6 inches of curtain for room air circulation.
 3. Curtain Heading: Triple thickness 2 inches wide, with stitched button holes for carriers 6 inches on center, double fold bottom hem 2 inches wide with lead weights included. Lock stitch seams in two rows. Turn seam edges and lock stitch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work of this Section.
- B. Verify that field measurements are as indicated.

3.02 INSTALLATION

- A. Install curtain track to be secure, rigid, and true to ceiling line.
- B. Install per manufacturer's recommended method.
- C. Install end cap and stop device.
- D. Secure track to ceiling system.
- E. Install curtains on carriers ensuring smooth operation.

END OF SECTION

SECTION 10523

FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 2007.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions and rough-in measurements for recessed cabinets.
- C. Product Data: Provide extinguisher operational features and color and finish.
- D. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.04 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguisher Cabinets and Accessories:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co: www.larsensmfg.com.
 - 3. Potter-Roemer: www.potterroemer.com.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed stainless steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration: Semi-recessed type.
 - 1. Sized to accommodate accessories.
 - 2. Trimless type.
 - 3. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

- C. Door: 0.036 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.
- D. Door Glazing: Glass, clear, 1/8 inch thick tempered. Set in resilient channel gasket glazing.
- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Weld, fill, and grind components smooth.
- G. Finish of Cabinet Exterior Trim and Door: Satin chrome.
- H. Finish of Cabinet Interior: White enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Cabinet Signage: Red applied lettering on cabinet door.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 48 inches from finished floor to handle of extinguisher.
- C. Secure rigidly in place.
- D. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 10660

FULL HEIGHT GLAZED PARTITION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Full height glass partition system.
- B. Fittings, hardware, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07900 - Joint Sealers.

1.03 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels; 2005
- B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2008.
- C. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005.
- D. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT, Coated and Uncoated Glass; 2004.
- E. ASTM C 1115 - Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories; 2006.
- F. GANA (GM) - GANA Glazing Manual; 2004.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene at project site seven (7) calendar days prior to scheduled start of construction activities of this section and review section requirements.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Include plans, elevations, and details showing type and thickness of metal and glass, glazing, anchoring, and joining, hardware, trim, and accessories.
- C. Product Data: Manufacturer's descriptive data and performance characteristics.
- D. Samples:
 - 1. Three (3) samples, 2 inches by 3 inches (minimum), showing actual material and finish of exposed metal components.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Approved by partition system manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to project site and store in manufacturer's protective cartons until openings are ready for installation.

- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.09 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty against degradation of finish. Include provision for replacement of units with fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Avanti Systems USA.
 - 1. Avanti Systems USA: www.avantisystemsusa.com
 - 2. Infinity Glass: www.infinity-glass.co.uk
 - 3. Permasteelisa: www.permasteelisa.com
- B. Substitutions: See Section 01600 - Product Requirements.

2.02 PRODUCTS

- A. Full-Height Glazed Partition Basis of Design System: Avanti Systems "Solare", straight, single-glazed, dry-jointed, extruded aluminum top and bottom rails, [< >], hardware, accessories.
- B. Regulatory Requirements:
 - 1. Provide tempered or laminated safety glass for locations subject to human impact as required by Building Code.
- C. Design Requirements: Design glass partition system to withstand live loads in accordance with Building Code resulting in maximum L/120 deflection.

2.03 MATERIALS

- A. Aluminum Extrusions:
 - 1. ASTM B 221, 6063-T6 alloy and temper.
 - 2. Factory-applied Polymer Finish: AAMA 2604, polyester powder coating, color to be selected from manufacturer's full color range.
- B. Glass:
 - 1. Clear Tempered Glass: ASTM C 1048, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select, Kind FT fully tempered, 1/2 inch thick.
- C. Glazing Gaskets:
 - 1. ASTM C 864, neoprene or EPDM molded or extruded shape to fit glazing channel retaining slot.
- D. Accessories: Provide manufacturer's standard accessory materials listed below.
 - 1. Concealed fasteners, anchors and attachments.
 - 2. Mounting and reinforcing brackets
 - 3. Junction clips.
 - 4. Reducers and adapters.
 - 5. Infill and trim.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings are acceptable.
- B. Do not begin installation until substrates and openings have been properly prepared.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings.
- B. Install components plumb and level, in proper plane, free from warp and twist.
- C. Tolerances, Partitions:
 - 1. Horizontal Components and Sight Lines: Not more than 1/8 inch in 10 feet variation from level, non-cumulative.
 - 2. Vertical Components and Sight Lines: Not more than 1/8 inch in 10 feet variation from plumb, non-cumulative.
 - 3. Variation from Plane or Indicated Location: Not more than 1/16.
- D. Install glass and accessories in accordance with GANA Glazing Manual.

3.03 CLEANING

- A. Clean installed work to like-new condition.
- B. Touch up minor scratches and abrasions to match original finish.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace products damaged before Substantial Completion.

END OF SECTION

SECTION 10800

TOILET ACCESSORIES

1. PART 1 - GENERAL

1.1. SUMMARY

- A. Public Restrooms:
 - 1. Toilet paper dispensers.
 - 2. Sanitary Napkin Disposal – Surface Mounted
 - 3. Grab Bar – Straight – Concealed Mounting
 - 4. Coat Hook
 - 5. Sanitary Napkin Dispenser – Semi-Recessed
 - 6. Touchless Paper Towel Dispenser
 - 7. Trash Receptacle
 - 8. Soap Dispenser
 - 9. Mirror – Frameless – 24"x36" – Surface Mounted
 - 10. Sanitary Napkin Dispenser
 - 11. Baby Changing Station

1.2. SUBMITTALS

- A. Product Data. Submit manufacturer's product data and installation instructions, including the following:
 - 1. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

2. PART 2 – PRODUCTS

2.1. MANUFACTURERS

- A. For each distinct type of toilet accessory, provide accessories fabricated by a single manufacturer.
- B. All model numbers specified are products of Bradley Corporation as basis of design unless noted otherwise.
- C. Equivalent products of the following other manufacturers, provided they comply with requirements of the contract documents, will be among those considered acceptable:
 - 1. Franklin Brass Manufacturing Company.
 - 2. American Specialties, Inc.
 - 3. Bobrick Corporation.
 - 4. McKinney/Parker, Inc., a Subsidiary of Essex Industries, Inc.
 - 5. A & J Washroom Accessories, Inc.
 - 6. General Accessory Manufacturing Co. (GAMCO)

2.2. TOILET ACCESSORIES

- A. Public Restrooms:

TOILET ACCESSORIES
Rappahannock Community College Renovation
Glenns and Warsaw, Virginia

10800-1
PC: 260-17712
5/11/2010

1. Toilet Paper Dispenser
 - a. Bradley Corporation: 5402
 - b. Bobrick Corporation: 2888
 - c. General Accessory Manufacturing Co. (GAMCO): TTD-5
2. Sanitary Napkin Disposal – Semi-Recessed:
 - a. Bradley Corporation: 4722-15
 - b. Bobrick Corporation: B-254
 - c. General Accessory Manufacturing Co. (GAMCO): ND-5
3. Grab Bar - Straight – Concealed Mounting:
 - a. Bradley Corporation: 812
 - b. Bobrick Corporation: B-6806
 - c. American Specialties, Inc.: 3200
4. Coat Hook:
 - a. Bradley Corporation: 9134
 - b. Bobrick Corporation: B-6827
 - c. General Accessory Manufacturing Co. (GAMCO): G-682SF
5. Touchless Paper Towel Dispenser – Surface Mounted:
 - a. Georgia Pacific Professional: 59460
 - b. Bradley Corporation: 2490
 - c. San Jamar: T1400TBK
6. Semi-Recessed Waste Receptacle:
 - a. Bradley Corporation: 346
 - b. Bobrick Corporation: B-3644
 - c. American Specialties, Inc.: 0458
7. Soap Dispenser:
 - a. Bradley Corporation: 6542
 - b. Bobrick Corporation: B-2112
 - c. American Specialties, Inc.: 0345
8. Mirror: **See Specification Section 08830**
9. Sanitary Napkin Dispenser - Surface Mounted:
 - a. Bradley Corporation: 4017-11
 - b. Bobrick Corporation: 2800
 - c. General Accessory Manufacturing Co. (GAMCO): NV-2-4FS
10. Baby Changing Station – Surface Mounted
 - a. Bobrick Corporation KB110-SSWM
 - b. Koala Kare Products: KB134-SSLD
 - c. Bradley Corporation: 9611

2.3. MATERIALS

- A. Mounting Devices and Fasteners: Provide toilet accessory manufacturer's recommended items for substrates and conditions indicated.

2.4. FABRICATION

- A. Manufacturer's Trademarks and Model Numbers: Neither name nor trademark of manufacturer is acceptable on exposed surfaces of accessories. Provide manufacturer's name and model number on stamped plate or waterproof label securely affixed to unexposed surface of accessory.

3. PART 3 – EXECUTION

3.1. INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- B. Accessories Installed for Use by Handicapped Persons: Install as indicated on drawings.

END OF SECTION

SECTION 11131

PROJECTION SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 09511 - Suspended Acoustical Ceilings: Suspended panel ceilings for recessed screens.
- B. Section 09900 - Paints and Coatings: Field painting.
- C. Section 16155 - Equipment Wiring: Electrical supply, conduit, and wiring for electric motor operated projection screens.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Wiring diagrams for motor operators and actuators, and controls and switches.
- C. Samples: For screen fabrics, submit three 4 by in size.
- D. Samples: For case and frame finishes, submit three 2 by in size, illustrating color and texture of finish.
- E. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.
- F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in VCCS's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Experienced in manufacturing products specified in this section.
- B. Installer Qualifications: Experienced in installation of the work of this section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver projection screens to project site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery.
- B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F. Stack according to manufacturer's recommendations.
- C. Acclimate screens to building temperatures for 24 hours prior to installation, or in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS

- A. Maintain interior of building between 60 degrees F and 75 degrees F during and after installation of projection screens.

1.07 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide 5 year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bretford: www.bretford.com.
- B. Da-Lite Screen Company: www.da-lite.com.
- C. Draper, Inc: www.draperinc.com.
- D. Stewart Filmscreen Corporation: www.stewartfilmscreen.com.

2.02 FRONT PROJECTION SCREENS

- A. General: Projection Screen Units are to be tested per NFPA 701.
- B. Manufacturers:
 - 1. Bretford: www.bretford.com.
 - 2. Da-Lite Screen Company: www.da-lite.com.
 - 3. Draper, Inc: www.draperinc.com.
- C. Front Projection Screens: Factory assembled unless otherwise indicated.
 - 1. In Classrooms: Motorized, matte light diffusing fabric screen, horizontally tensioned , ceiling recessed.
 - a. Screen Dimensions: 96 inches by 96 inches.
- D. Matte Light Diffusing Fabric: Light diffusing screen fabric; washable, flame retardant and mildew resistant.
 - 1. Material: Matte white vinyl on fiberglass backing, with nominal gain of 1.0 over viewing angle not less than 70 degrees from axis, horizontally and vertically.
 - 2. Seams: No seams permitted in fabric up to 96 inches high by 96 inches wide.
- E. Masking Borders: White, four sides.
- F. Concealed-in-Ceiling Screen Cases: Steel; integral roller brackets.
 - 1. Door Slat: Self trim; self-closing and -opening.
 - 2. Case Finish: Baked enamel.
 - 3. Case Color: White.
 - 4. End Caps: Steel; finished to match case.
 - 5. Electrically-Operated Screens: 1-1/2 inch aluminum door roller.
- G. Electrically-Operated Screens:
 - 1. Roller: 2 inch aluminum, with locking device.
 - 2. Vertical Tensioning: Screen fabric weighted at bottom with steel bar with plastic end caps.
 - 3. Horizontal Tensioning: Tab-guided cable system.
- H. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.03 ELECTRICAL COMPONENTS

- A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Motors: Direct drive, 110 V, 60 Hz.
 - 1. Screen Motor: Mounted inside roller; three wire with ground; quick reverse type; equipped with thermal overload cut-off.

- a. Electrical Characteristics: 1.2 amps.
 - b. Motor mounted on sound absorber.
- 2. Door and Adjustable Masking Motor: Mounted inside roller; three wire with ground; quick reverse type; equipped with thermal overload cut-off.
 - a. Electrical Characteristics: 1.2 amps.
- C. Controls: 3 position control switch with plate.
 - 1. Provide 1 control station to screen.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is finished and ready to accept screen installation.
- B. If substrate preparation is the responsibility of another installer, notify nbj Architecture of unsatisfactory preparation before proceeding.
- C. Verify that openings for recessed screens are correctly sized.
- D. Verify type and location of electrical connections.
- E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

- A. Coordinate screen installation with installation of projection systems.
- B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.
- B. Do not field cut screens.
- C. Install screens in mountings as specified and as indicated on drawings.
- D. Install plumb and level.
- E. Install electrically operated screens ready for connection to power and control systems by others.
- F. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.
- G. Test electrical screens for proper working condition. Adjust as needed.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11600 - LABORATORY EQUIPMENT - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessories, necessary to furnish, deliver and install:
 - 1. Section 11650 - Miscellaneous Laboratory Equipment: Glassware Washers (Flask Scrubbers), DI Water Polishers, Water Distillers and Goggle Cabinets
 - 2. Section 11680 - Headwalls - Bed Locators and Horizontal Headwalls
- B. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- C. This Section also includes all general requirements, applicable to this and all other Equipment Specification Sections including, but not limited to:
 - Definitions
 - System description
 - Scope
 - Submittals
 - Quality assurance
 - Mock-up
 - Testing
 - Field measurements
 - Pre-installation conference
 - Delivery, storage and handling
 - Project conditions
 - Sequencing
 - Materials
 - Components
 - Finish and performance requirements
 - Examination, Installation, Adjusting, Cleaning and Protection Requirements
- D. Related Sections:
 - 1. Section 12309 - Laboratory Service Fixtures
 - 2. Section 12345 - Metal Laboratory Casework and Hoods: Chemical Fume Hoods, Bio-safety Cabinets, Acid Storage Cabinets, Solvent Storage Cabinets and Vacuum Pump Cabinets
 - 3. Section 12346 - Wood Laboratory Casework
 - 4. Division 15 - Mechanical: Mechanical Connections
 - 5. Division 16 - Electrical: Electrical Connections
- E. Quality Assurance
 - 1. Single Source Responsibility:

- a. Furnish products for each type of equipment from one manufacturer for entire Project, unless otherwise acceptable to Architect.
 - b. Provide each product as complete unit, including accessory items necessary for proper operation.
2. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section.
3. Installer Qualifications: Manufacturer, or approved in writing by manufacturer.

1.02 SUBMITTALS

A. Shop drawings:

1. Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
2. Indicate typical layout including dimensions, locations, large-scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, and clearances required.
3. Submit detail drawings of special accessory components not included in manufacturer's product data.
4. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

B. Product Data:

1. Submit manufacturer's descriptive literature and product specifications for each product.
2. Include data to indicate equipment dimensions and construction, equipment capacities, and point loads.
3. Include information for factory finishes, hardware, glass, sealants, accessories and other required components.
4. Include wiring diagrams and rough-in requirements.

C. Samples:

1. Finishes. Include color charts for finish indicating manufacturer's full range of colors available for selection.

D. Qualification Data:

1. Submit manufacturer's and installer's qualifications verifying experience.
2. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.

E. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

F. Operation and Maintenance Data:

1. Submit manufacturer's printed, recommended operation and maintenance data.
2. Include description of equipment operations, adjusting, and testing.
3. Identify system maintenance requirements, servicing cycles, and spare part sources.

- G. Warranty: Submit specified warranty in accordance with Division 1.

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Manufacturer is responsible for designing units, including anchorage of units to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
2. Dimensions, voltages, electrical power requirements, and utility connections are based on the items specified. Contractor is responsible for all costs for dimensional adjustments and for providing or arranging for additional electrical or utility services or equipment required as a result of using an equal product.
3. Provide concealed fastening wherever possible.
4. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between utility connections and units.
5. Equipment may be inspected by Owner at manufacturer's plant prior to shipment. Equipment found not in accord with specifications and approved Drawings may be rejected. Replace rejected equipment at no cost to Owner.
6. Electric operated and/or heated equipment: Comply with latest standards of National Electrical Manufacturer's Association (NEMA), National Electric Code (NEC) and Underwriters' Laboratories, Inc., (UL).

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Contractor furnished, Contractor installed equipment (C/C):

1. Contractor shall be responsible for furnishing and installing equipment.
2. Contractor to deliver to site in manufacturer's original labeled containers, and to store equipment to prevent damage to materials or structure in dry, weather tight, ventilated spaces, protect exposed surfaces and edges until work is completed, and repair or remove and replace damaged or rejected work.

B. Owner furnished, Contractor installed equipment (O/C):

1. New Equipment:
 - a. Owner will be responsible for shipping these items to project site.
 - b. Contractor shall be responsible for unloading, handling, storing, unpacking, assembling, installing and connecting equipment, and removing debris.
 - c. Contractor to store equipment to prevent damage to materials or structure in dry, weather tight, ventilated spaces, and to protect exposed surfaces and edges until work is completed.
2. Existing Equipment:
 - a. Owner will disconnect, move, and place equipment in proximity of new location.
 - b. Contractor shall be responsible for moving equipment to final location, unpacking, assembling, installing, and connecting equipment, and removing debris.
 - c. Contractor to store equipment to prevent damage to materials or structure in dry, weather-tight, ventilated spaces, and to protect exposed surfaces and edges until work is completed.

3. Owner furnished, Owner installed (O/O):
 - a. Future equipment and "NIC" equipment (Not in Contract under Base Bid)
 - b. Contractor to provide all structural, mechanical and electrical rough-in indicated.

1.05 JOB CONDITIONS

- A. Drawings show arrangement and location of items of equipment. If it is necessary to vary from arrangement shown, because of structural, mechanical, electrical or other considerations, make such variations only after approval of Architect and at no additional expense to Owner.
- B. Verify all dimensions at building.
- C. Measure all recesses and openings at buildings and provide all trim pieces, fillers, and closures, in sizes required.

1.06 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference in accordance with Division 1.
- B. Convene pre-installation conference one week prior to commencing work of this Section.
- C. Attendance Required: Owner, Architect, Contractor, Manufacturer's Representative, and Installer.
- D. Agenda: Discuss and agree upon acceptable substrate and support conditions, preparatory work, interface with mechanical and electrical services, and methods of installation and testing.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Acceptable manufacturers:
 1. Laboratory equipment: As noted for individual items. Layouts, dimensions, voltages, electrical power requirements, and utilities connections are based on the items specified.
 2. The Naming of manufacturer(s) and designation of product is for the purpose of identifying and describing required product and not to limit competition. Other manufacturers capable of producing the same appearance and having the same quality, durability, and performance may be proposed for use on this project subject to Architect's approval, unless noted otherwise.
 3. Other approved manufacturers are responsible for all adjustments required to fit their products to the work at no additional cost.
 4. Provide equipment of each specialty type (as designated by Sections referenced) by one manufacturer, insofar as is possible, and except as otherwise indicated.

2.02 EQUIPMENT SCHEDULE

- A. Refer to Equipment Schedule bound at the end of this Section.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with work in accordance with specifications.
- B. Verify that utility connections are in place and correctly positioned.
- C. Verify that rough-in frames, anchors, and supports are accurately placed.
- D. Correct unsatisfactory conditions.
- E. Start of work constitutes acceptance of responsibility for performance.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Follow manufacturer's printed instructions or drawings in all cases where items or details are not indicated.
- C. Except for final connection, installation of each item shall be complete in every respect.
 - 1. Provide all controls, regulating devices and all other accessories necessary for proper operation and maintenance of equipment including, but not necessarily limited to, pressure reducing valves, strainers, steam traps, control valves, relief valves, etc.
 - 2. Include all accessories whether or not they are specifically indicated.
- D. Where an item of equipment is furnished without a cord and plug, electrical wiring in or on equipment shall be brought to an equipment junction box located on, and as a part of equipment, such that a flexible connection no longer than 3 ft. will be needed to make a final connection between item and rough-in junction box.
- E. Provide all stands, supports, sleeves, collars, escutcheons, brackets, braces or other miscellaneous items required for a complete installation.
- F. Install equipment plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction and adjacent surfaces.
- G. Repair or replace damaged, stained or rejected work.
- H. Test and adjust all items of equipment for satisfactory operation.
- I. Interface With Other Work: Coordinate equipment installation with size, location, and installation of service utilities.
- J. Sequences of Operation: Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

3.03 CLEANING

- A. Remove protective coverings from pre-finished units.
- B. Clean as required by manufacturer. Do not use materials or methods, which may damage finish or surrounding construction.

- C. Touch-up minor damaged surfaces caused during installation; replace damaged components as directed by Architect.

3.04 PROTECTION

- A. Protect finished work.

3.05 OWNER INSTRUCTION

- A. Perform instruction of Owner personnel: See Division 1.

END OF SECTION 11600

Equipment List - Sorted by space

Rappahannock Community College
Glenns / Warsaw, VA
Glenns & Warsaw Campus Renovations

Room Number	Space Name	Equip No.	Description	Quantity	Spec. No.	Furnish / Install	New / Exist	Mounted	Size	Manuf.	Model No.	Remarks
151	Nursing Skills Teaching Lab #2	EQ-22	Patient Bed	4	NIC	O/O	N	F	92"Lx42"Wx30"H	Hill-Rom	Resident LTC Bed	Adjustable Height
151	Nursing Skills Teaching Lab #2	EQ-23	Bed Locator	5	11680	C/C	N	WL	5"Lx50"Wx32"H	Hill-Rom	P0052B1	
151	Nursing Skills Teaching Lab #2	EQ-24	Horizontal Headwall (with service outlets)	1	11680	C/C	N	WL	8 ft Wx14"H	Hill-Rom	UniFlex 1000	Connected to simulated services
151	Nursing Skills Teaching Lab #2	EQ-25	Horizontal Headwall (with dummy service outlets)	4	11680	C/C	N	WL	8 ft Wx14"H	Hill-Rom	UniFlex 1000	No service connections
151	Nursing Skills Teaching Lab #2	EQ-26	SimMan (at Warsaw)	1	NIC	O/O	N			Laerdal	211-00050	(NOT LOCATED)
151	Nursing Skills Teaching Lab #2	EQ-27	Bed Side Movable Cabinet	5	NIC	O/O	E	F				(NOT LOCATED)
151	Nursing Skills Teaching Lab #2	EQ-28	Mobile Supplies Cabinet	1	NIC	O/O	E	F				(NOT LOCATED)
151	Nursing Skills Teaching Lab #2	EQ-29	Over-the-Bed Table	5	NIC	O/O	E	F				(NOT LOCATED)
151	Nursing Skills Teaching Lab #2	EQ-34	SimMan Patient Bed	1	NIC	O/O	N	F	94"Lx40"Wx44"H	Hill-Rom	TotalCare Bed System	Adjustable Height
151	Nursing Skills Teaching Lab #2	EQ-35	SimMan (at Glenns)	1	NIC	O/O	E			Laerdal	PRO-M030-003	(NOT LOCATED)
151	Nursing Skills Teaching Lab #2	EQ-36	Nurse Call	5	NIC	O/O	N			Edwards	6538 System	Mounted on Horizontal Headwalls
152	Nursing Storage	EQ-33	NOT USED									
153	Nursing Skills Teaching Lab #1	EQ-22	Patient Bed	4	NIC	O/O	N	F	92"Lx42"Wx30"H	Hill-Rom	Resident LTC Bed	Adjustable Height
153	Nursing Skills Teaching Lab #1	EQ-23	Bed Locator	5	11680	C/C	N	WL	5"Lx50"Wx32"H	Hill-Rom	P0052B1	
153	Nursing Skills Teaching Lab #1	EQ-24	Horizontal Headwall (with service outlets)	1	11680	C/C	N	WL	8 ft Wx14"H	Hill-Rom	UniFlex 1000	Connected to simulated services
153	Nursing Skills Teaching Lab #1	EQ-25	Horizontal Headwall (with dummy service outlets)	4	11680	C/C	N	WL	8 ft Wx14"H	Hill-Rom	UniFlex 1000	No service connections
153	Nursing Skills Teaching Lab #1	EQ-26	SimMan (at Warsaw)	1	NIC	O/O	N			Laerdal	211-00050	(NOT LOCATED)
153	Nursing Skills Teaching Lab #1	EQ-27	Bed Side Movable Cabinet	5	NIC	O/O	E	F				(NOT LOCATED)
153	Nursing Skills Teaching Lab #1	EQ-28	Mobile Supplies Cabinet	1	NIC	O/O	E	F				(NOT LOCATED)
153	Nursing Skills Teaching Lab #1	EQ-29	Over-the-Bed Table	5	NIC	O/O	E	F				(NOT LOCATED)
153	Nursing Skills Teaching Lab #1	EQ-34	SimMan Patient Bed	1	NIC	O/O	N	F	94"Lx40"Wx44"H	Hill-Rom	TotalCare Bed System	Adjustable Height
153	Nursing Skills Teaching Lab #1	EQ-35	SimMan (at Glenns)	1	NIC	O/O	E			Laerdal	PRO-M030-003	(NOT LOCATED)
153	Nursing Skills Teaching Lab #1	EQ-36	Nurse Call	5	NIC	O/O	N			Edwards	6538 System	Mounted on Horizontal Headwalls
157	Chemistry / Physics Prep Lab	EQ-02	ADA Fume Hood - 6'	1	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
157	Chemistry / Physics Prep Lab	EQ-11	Glassware Washer (Flask Scrubber)	1	11650	C/C	N	F	27"Lx24"Wx34"H	Labconco	4420330	Undercounter
157	Chemistry / Physics Prep Lab	EQ-11a	Water Pro RO Station	1	11650	C/C	N	WL	8"Lx32"Wx31"H	Labconco	9075000	Connected to EQ-11
158	Chemistry / Physics Teaching Lab	EQ-01	Fume Hood - 6'	1	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
158	Chemistry / Physics Teaching Lab	EQ-02	ADA Fume Hood - 6'	1	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
158	Chemistry / Physics Teaching Lab	EQ-03	Future Fume Hood - 6'	4	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		Future. Capped services at ceiling
158	Chemistry / Physics Teaching Lab	EQ-07	Refrigerator	1	NIC	O/O	N	F	36"Lx34"Wx70"H	Kenmore	59962	with Ice Maker
158	Chemistry / Physics Teaching Lab	EQ-12	Goggle Cabinet	1	11650	C/C	N	WL	25"Lx10"Wx32"H	Kewaunee	F-5334-00	
158	Chemistry / Physics Teaching Lab	EQ-21	Smart AV / IT Station	1	NIC	O/O	N	F				
158	Chemistry / Physics Teaching Lab	EQ-31	Air Tracks	3	NIC	O/O	E	B				(NOT LOCATED)

Equipment List - Sorted by space

Rappahannock Community College
Glenns / Warsaw, VA
Glenns & Warsaw Campus Renovations

Room Number	Space Name	Equip No.	Description	Quantity	Spec. No.	Furnish / Install	New / Exist	Mounted	Size	Manuf.	Model No.	Remarks
158	Chemistry / Physics Teaching Lab	EQ-32	Water Distiller	1	11650	C/C	N	WL	12"Lx15"Wx30"H	Barnstead	FI Stream 2S Glass Still	4 lt. capacity, with A1052 (8 lt. storage bottle)
159	Biology Teaching Lab #1 / Shared	EQ-02	ADA Fume Hood - 6'	1	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
159	Biology Teaching Lab #1 / Shared	EQ-04	BioSafety Cabinet - Type II A2	1	12345	C/C	N	F	78"Lx33"Wx95"H	NuAire	NU-425-600	Non-Ducted
159	Biology Teaching Lab #1 / Shared	EQ-05	DI Water Polisher	1	11650	C/C	N	WL	10"Lx12"Wx18"H	Millipore	Direct Q-5	with 10 L Reservoir Tank
159	Biology Teaching Lab #1 / Shared	EQ-07	Refrigerator	1	NIC	O/O	N	F	36"Lx34"Wx70"H	Kenmore	59962	with Ice Maker
159	Biology Teaching Lab #1 / Shared	EQ-08	Digital Incubator	1	NIC	O/O	N	F	19"Lx13"Wx21"H	Carolina Biological Supply Company	12-140E	Catalogue # NP-70-1294 (NOT LOCATED)
159	Biology Teaching Lab #1 / Shared	EQ-09	Autoclave	1	NIC	O/O	E	B	20"Lx22"Wx15"H	Tuttnauer	2340M	Chamber Size: 9" x 18" (NOT LOCATED)
159	Biology Teaching Lab #1 / Shared	EQ-10	Water Bath	1	NIC	O/O	E	B	24"Lx14"Wx10"H	Precision	185	(NOT LOCATED)
159	Biology Teaching Lab #1 / Shared	EQ-12	Goggle Cabinet	1	11650	C/C	N	WL	25"Lx10"Wx32"H	Kewaunee	F-5334-00	
159	Biology Teaching Lab #1 / Shared	EQ-21	Smart AV / IT Station	1	NIC	O/O	N	F				
160	Biology Prep Lab	EQ-02	ADA Fume Hood - 6'	1	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
160	Biology Prep Lab	EQ-04	BioSafety Cabinet - Type II A2	1	12345	C/C	N	F	78"Lx33"Wx95"H	NuAire	NU-425-600	Non-Ducted
160	Biology Prep Lab	EQ-11	Glassware Washer (Flask Scrubber)	1	11650	C/C	N	F	27"Lx24"Wx34"H	Labconco	4420330	Undercounter
160	Biology Prep Lab	EQ-11a	Water Pro RO Station	1	11650	C/C	N	WL	8"Lx32"Wx31"H	Labconco	9075000	Connected to EQ-11
161	Biology Teaching Lab #2	EQ-02	ADA Fume Hood - 6'	1	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
161	Biology Teaching Lab #2	EQ-04	BioSafety Cabinet - Type II A2	1	12345	C/C	N	F	78"Lx33"Wx95"H	NuAire	NU-425-600	Non-Ducted
161	Biology Teaching Lab #2	EQ-05	DI Water Polisher	1	11650	C/C	N	WL	10"Lx12"Wx18"H	Millipore	Direct Q-5	with 10 L Reservoir Tank
161	Biology Teaching Lab #2	EQ-06	Refrigerator	1	NIC	O/O	E	F	36"Lx34"Wx70"H	Galaxy Microsystems	55622	with Ice Maker
161	Biology Teaching Lab #2	EQ-08	Digital Incubator	1	NIC	O/O	N	F	19"Lx13"Wx21"H	Carolina Biological Supply Company	12-140E	Catalogue # NP-70-1294 (NOT LOCATED)
161	Biology Teaching Lab #2	EQ-09	Autoclave	1	NIC	O/O	E	B	20"Lx22"Wx15"H	Tuttnauer	2340M	Chamber Size: 9" x 18" (NOT LOCATED)
161	Biology Teaching Lab #2	EQ-10	Water Bath	1	NIC	O/O	E	B	24"Lx14"Wx10"H	Precision	185	(NOT LOCATED)
161	Biology Teaching Lab #2	EQ-12	Goggle Cabinet	1	11650	C/C	N	WL	25"Lx10"Wx32"H	Kewaunee	F-5334-00	
161	Biology Teaching Lab #2	EQ-21	Smart AV / IT Station	1	NIC	O/O	N	F				

NIC Not In Contract
N New Equipment
E Existing Equipment
B Bench Top Equipment
F Floor Mounted Equipment
WL Wall Mounted Equipment
S Suspended Equipment
C Ceiling Mounted Equipment
L Length
W Width
H Height
O/O Owner Furnished / Owner Installed
C/C Contractor Furnished / Contractor Installed
BSC Biosafety Cabinet
ADA Americans with Disabilities Act

Equipment List - Sorted by number

Rappahannock Community College
Glenns / Warsaw, VA
Glenns & Warsaw Campus Renovations

Equip No.	Description	Spec. No.	Furnish / Install	New / Exist	Mounted	Size	Manuf.	Model No.	Remarks
EQ-01	Fume Hood - 6'	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
EQ-02	ADA Fume Hood - 6'	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		
EQ-03	Future Fume Hood - 6'	12345	C/C	N	F	72"Lx36"Wx84"H	Kewaunee		Future. Capped services at ceiling
EQ-04	BioSafety Cabinet - Type II A2	12345	C/C	N	F	78"Lx33"Wx95"H	NuAire	NU-425-600	Non-Ducted
EQ-05	DI Water Polisher	11650	C/C	N	WL	10"Lx12"Wx18"H	Millipore	Direct Q-5	with 10 L Reservoir Tank
EQ-06	Refrigerator	NIC	O/O	E	F	36"Lx34"Wx70"H	Galaxy	55622	with Ice Maker
EQ-07	Refrigerator	NIC	O/O	N	F	36"Lx34"Wx70"H	Microsystems Kenmore	59962	with Ice Maker
EQ-08	Digital Incubator	NIC	O/O	N	F	19"Lx13"Wx21"H	Carolina Biological Supply Company	12-140E	Catalogue # NP-70-1294 (NOT LOCATED)
EQ-09	Autoclave	NIC	O/O	E	B	20"Lx22"Wx15"H	Tuttnauer	2340M	Chamber Size: 9" x 18" (NOT LOCATED)
EQ-10	Water Bath	NIC	O/O	E	B	24"Lx14"Wx10"H	Precision	185	(NOT LOCATED)
EQ-11	Glassware Washer (Flask Scrubber)	11650	C/C	N	F	27"Lx24"Wx34"H	Labconco	4420330	Undercounter
EQ-11a	Water Pro RO Station	11650	C/C	N	WL	8"Lx32"Wx31"H	Labconco	9075000	Connected to EQ-11
EQ-12	Goggle Cabinet	11650	C/C	N	WL	25"Lx10"Wx32"H	Kewaunee	F-5334-00	
EQ-13	Aquarium	NIC	O/O	E	B				(NOT LOCATED)
EQ-14	Balance	NIC	O/O	E	B		Ohaus	Scout Pro 200g	(NOT LOCATED)
EQ-15	Analytical Balance	NIC	O/O	E	B				(NOT LOCATED)
EQ-16	Triple Beam Balance	NIC	O/O	E	B				(NOT LOCATED)
EQ-17	Oven	NIC	O/O	E	B		Despatch	LEB 1-23	(NOT LOCATED)
EQ-18	Centrifuge	NIC	O/O	E	B				(NOT LOCATED)
EQ-19	Spectronic-20	NIC	O/O	E	B		Thermo Scientific	Spectronic 20D+	(NOT LOCATED)
EQ-20	Hot Plate	NIC	O/O	E	B				(NOT LOCATED)
EQ-21	Smart AV / IT Station	NIC	O/O	N	F				
EQ-22	Patient Bed	NIC	O/O	N	F	92"Lx42"Wx30"H	Hill-Rom	Resident LTC Bed	Adjustable Height
EQ-23	Bed Locator	11680	C/C	N	WL	5"Lx50"Wx32"H	Hill-Rom	Bed Locator P0052B1	
EQ-24	Horizontal Headwall (with service outlets)	11680	C/C	N	WL	8 ft Wx14"H	Hill-Rom	UniFlex 1000	Connected to simulated services
EQ-25	Horizontal Headwall (with dummy service outlets)	11680	C/C	N	WL	8 ft Wx14"H	Hill-Rom	UniFlex 1000	No service connections

Equipment List - Sorted by number

Rappahannock Community College
Glenns / Warsaw, VA
Glenns & Warsaw Campus Renovations

Equip No.	Description	Spec. No.	Furnish / Install	New / Exist	Mounted	Size	Manuf.	Model No.	Remarks
EQ-26	SimMan (at Warsaw)	NIC	O/O	N			Laerdal	211-00050	(NOT LOCATED)
EQ-27	Bed Side Movable Cabinet	NIC	O/O	E	F				(NOT LOCATED)
EQ-28	Mobile Supplies Cabinet	NIC	O/O	E	F				(NOT LOCATED)
EQ-29	Over-the-Bed Table	NIC	O/O	E	F				
EQ-30	Biological Microscope	NIC	O/O	E	B		Motic	BA300	(NOT LOCATED)
EQ-31	Air Tracks	NIC	O/O	E	B				
EQ-32	Water Distiller	11650	C/C	N	WL	12"Lx15"Wx30"H	Barnstead	F1 Stream 2S Glass Still	4 lt. capacity, with A1052 (8 lt. storage bottle)
EQ-33	NOT USED								
EQ-34	SimMan Patient Bed	NIC	O/O	N	F	94"Lx40"Wx44"H	Hill-Rom	TotalCare Bed System	Adjustable Height
EQ-35	SimMan (at Glenns)	NIC	O/O	E			Laerdal	PRO-M030-003	(NOT LOCATED)
EQ-36	Nurse Call	NIC	O/O	N			Edwards	6538 System	Mounted on Horizontal Headwalls

NIC Not In Contract
N New Equipment
E Existing Equipment
B Bench Top Equipment
F Floor Mounted Equipment
WL Wall Mounted Equipment
S Suspended Equipment
C Ceiling Mounted Equipment
L Length
W Width
H Height
O/O Owner Furnished / Owner Installed
C/C Contractor Furnished / Contractor Installed
BSC Biosafety Cabinet
ADA Americans with Disabilities Act

SECTION 11650 - MISCELLANEOUS LABORATORY EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessories, necessary to furnish, deliver and install:
 - 1. Glassware Washers (Flask Scrubbers)
 - 2. DI Water Polishers
 - 3. Water Distillers
 - 4. Goggle Cabinets
- B. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- C. For general requirements applicable to this and all other Laboratory Equipment Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 11600 - Laboratory Equipment - General Requirements.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For general requirements applicable to this and all other Laboratory Equipment Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 11600 - Laboratory Equipment - General Requirements.

2.02 GLASSWARE WASHER (FLASK SCRUBBER)

- A. Acceptable Manufacturers & Products:
 - 1. Labconco, Kansas City, MO (Flask Scrubber Model # 44203-30 with RO Station # 90750-00)
 - 2. Scientek, Richmond, B.C., Canada
 - 3. Hotpack, Warminster, PA
- B. Description:
 - 1. Under Counter Flask Scrubber Glassware Washer for 115 volt operation with viewing window.
 - 2. The Washer shall be a cabinet-type washer with completely automatic solid-state circuitry that monitors and controls all cycle phases.
 - 3. The enclosed washer shall be mounted under a counter.

4. Washer shall meet the Underwriters Laboratories (UL) Standard 544 as certified by ETL Testing Laboratories, Inc.
 5. Chamber load capacity: 22-1/2" W x 21" D x 18" H
 6. Exterior dimensions: 24" W x 27" D x 34-1/2" H
 7. Heaters: A 750 watt sump heater and 700 watt steam heater to boost water and glass-ware temperatures during washing and drying shall be provided. Minimum inlet temperature of 120° F (49° C). The sump heater shall elevate water temperature approximately 20° F (11° C).
 8. View Window and Light: Clear tempered safety glass window, 6" W x 13" H, shall be located in the door. A 25-Watt interior light shall remain lit while the door latch is engaged.
 9. It shall include ultra-pure water final rinse.
- C. Construction:
1. Tank, wash arms, tower and side rails shall be constructed of Type 304 stainless steel with mirror finish. Tank shall have two rows of polypropylene rollers. Tower shall telescope and lock in two positions. Fiberglass blanket and aluminum-backed acoustic material shall provide thermal and sound insulation. A draw latch shall energize the electronic controls when locked.
- D. Control Panel:
1. Injection molded panel shall have microprocessor that stores five factory preset programs (RINSE ONLY, PLASTIC, GLASS, GLASS PLUS AND SCIENTIFIC) and two user set programs (USER 1 SET and USER 2 SET).
- E. Racks and Inserts:
1. Shall be constructed of Type 304 stainless steel.
 2. The following Racks, Inserts and Accessories shall be provided:
 - a. Adjustable Height Top Rack
 - b. Bottom Rack
 - c. Utensil Basket
- F. RO Station:
1. Wall mounted RO Station
 2. Typical Flow Rate - Maximum Liter/Min. (at 25° C): 1.0
 3. Minimum Feedwater Quality: Tap water
 4. Bowls: Constructed of white polypropylene. Bowls shall be included for one prefilter, one carbon filter and one reverse osmosis membrane. A spanner wrench shall be provided for filter changes. Cartridges are not included.
 5. Cabinet:
 - a. Overall dimensions (including bowls): 31 1/8" w x 7 23/32" d x 30 3/8" h).
 - b. Constructed of epoxy-coated steel with Type 304 stainless steel front panel. It shall include 1/4 hp motor/rotary vane booster pump, RO membrane back pressure relief valve preset to 150 psi, internal pressure gauge with range from 0 to 160 psi, automatic flush valve, air vent filter, tank check valve and hardware for wall mounting.
 6. Control Panel:

- a. It shall Include ON/OFF switch; LED display; μ S, TEMP ° C, TIME DISP. and TANK FULL indicator lights; DISPENSE switch for water delivery control from valve; MODE switch for selecting LED display; and increase/decrease switch for setting dispensing time from 0 to 99.9 minutes.
 - b. LED display shall show actual water quality from 1 to 999 microseimens (μ S), actual water temperature in ° C or dispense time in minutes.
7. Storage Tank:
- a. Constructed of polyethylene with 17 liter capacity.
 - b. Housing shall be thermoplastic and epoxy-coated steel.
 - c. It shall include outlet port for 1/2" OD plastic tubing for connection to glassware washer.

2.03 DI WATER POLISHER

A. Acceptable Manufacturers & Products:

- 1. Millipore Corp., Marlborough, MA (Model # Direct-Q 5 Ultrapure Water System)
- 2. Barnstead/Thermolyne, Dubuque, Iowa
- 3. Siemens Water Technologies, Lowell, MA

B. Description:

- 1. The point of use ultra-pure water system shall provide type I, 18 meg-ohm quality water with <10 ppb TOC and <0.001 EU/mL pyrogen levels, at locations indicated on drawings.
- 2. The unit shall be provided with a 10 L reservoir tank. The 10L reservoir tank shall be automatically refilled when the water level drops below 9.5L.
- 3. Feed Water: Tap water.
- 4. The system shall be installed complete with interconnecting plumbing and electrical work per the drawings and specifications.
- 5. The vendor shall supply all of the major system components and necessary cartridges.
- 6. The system shall be a virtually silent unit, generating less than 40 decibels at a 1 meter distance from the system.
- 7. It shall be wall mounted without the addition of any special brackets and it shall come complete with a remote dispenser to allow delivery of water up to 9 feet away from the unit.
- 8. The unit shall be have a microprocessor controlled purity monitor and controls for simple and accurate operation.

2.04 WATER DISTILLER

A. Acceptable Manufacturers & Products:

- 1. Barnstead/Thermolyne, Dubuque, Iowa (Model # FI-Streem III 4 Liter Glass Still, Model # A56210-857 with 8 Liter Capacity Storage Reservoir, Model # A1052)
- 2. Millipore Corp., Marlborough, MA
- 3. Siemens Water Technologies, Lowell, MA

B. Description:

- 1. Totally enclosed, 4 Liter Glass Still.

2. The unit shall have a fully automatic microprocessor controls.
3. The system shall be installed complete with interconnecting plumbing and electrical work per the drawings and specifications. The same vendor shall supply all of the major system components and necessary cartridges.
4. Feed Water: Pre-treated feed water
5. The system shall be a virtually silent unit, generating less than 40 decibels at a 1 meter distance from the system.
6. It shall be wall mounted without the addition of any special brackets.
7. Thermistor and heat sensor shall offer double protection against low water conditions.
8. 24-hour automatic operation.
9. Flow switch to allow for automatic operation with other storage bottles.
10. Complete with an 8 liter Storage Reservoir. It shall include wall mounting bracket for easy installation.

2.05 GOGGLE CABINETS

A. Acceptable Manufacturers & Products:

1. Kewaunee Scientific Corporation, Statesville, NC (Model No. F-5334-00)
2. Science Kit, Tonawanda, NY
3. Leonard Peterson & Co., Auburn, AL

B. Description:

1. The goggle cabinet shall provide dry sterilization using ultraviolet radiation.
2. When the doors are closed and locked, the interior can be flooded with ultraviolet, killing bacteria. A safety closure mechanism automatically shall shut off the ultraviolet when the doors are opened.
3. A built-in timer shall control the sanitizing.
4. It shall be constructed of heavy-gauge steel.
5. The cabinet shall hold 30 pairs of goggles minimum.
6. Dimensions: 24" W x 32" H
7. UL listed.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements applicable to this and all other Laboratory Equipment Specification Sections including, but not limited to, examination, installation, adjusting, cleaning, and protection requirements, refer to Specification Section 11600 - Laboratory Equipment - General Requirements

END OF SECTION 11650

SECTION 11680 – HEADWALLS

PART 1 - GENERAL

1.01 SUMMARY

- A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, Section 11600 - Laboratory Equipment - General Requirements, and Drawings, apply to Work of this Section.
- B. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessories, necessary to furnish, deliver and install:
 - 1. Bed Locators
 - 2. Horizontal Headwalls
 - 3. Accessories
- C. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- D. The Manufacturer shall be responsible for coordinating with architect and manufacturers of equipment not supplied by the system manufacturer, to insure compatibility with the equipment.
- E. For general requirements applicable to this and all other Laboratory Equipment Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 11600 - Laboratory Equipment - General Requirements.

1.02 CERTIFICATIONS

- A. The headwalls shall be listed by Underwriters Laboratories Inc. Supplier to furnish U.L. listing numbers with quotations.
- B. Provide certification for each item, that the products provided have been evaluated by the National Recognized Testing Laboratory (NRTL) to the applicable ANSI/UL and CSA Standards, for use in the US.
- C. The recommendation of the National Fire Protection Association (NFPA), the National Electrical Code (NEC) the state and local codes that apply to this installation shall be adhered to in all respects. The installing contractor shall be responsible for compliance with all local, state and federal codes applicable to this installation.

1.03 RELATED SECTIONS:

- A. Section 11600 - Laboratory Equipment - General Requirements

- B. Division 15 - Mechanical: Mechanical contractors shall provide primary services and make connections to appropriate installed mechanical equipment of the headwall and power column systems as shown on plans and as herein specified.
- C. Division 16 - Electrical: Contractor shall install headwall and power column systems and related equipment, wiring and conduit and make necessary connections as shown on the plans and as herein specified.

1.04 SEQUENCING

- A. Sequence work under provisions of Division 1.
- B. Coordinate with plumbing rough-in requirements specified in Division 15.
- C. Coordinate with mechanical requirements specified in Division 15.
- D. Coordinate with electrical rough-in requirements specified in Division 16.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For general requirements applicable to this and all other Laboratory Equipment Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 11600 - Laboratory Equipment - General Requirements.

2.02 BED LOCATORS

- A. Acceptable Manufacturers & Products:
 - 1. Hill-Rom, Batesville, IN (Model # Bed Locator P0052B1)
 - 2. The Headwall Company, Oklahoma City, OK
 - 3. Amico Corporation, Amityville, NY
- B. Description:
 - 1. The Bed Locator shall provide a "docking" location for the patient bed that will position the bed and protect the wall.
 - 2. The Bed Locator shall have access to electrical devices on each side. Provide devices as shown on Lab Drawings.
 - 3. Services shall be segregated into compartments and shall be pre-installed. Devices are pre-wired to service termination locations and shall be ready for connection to the incoming services being fed from the building wall behind.
 - 4. The Bed Locator module shall incorporate 16-gauge steel housing for installation of the electrical devices. This housing shall be trimmed with a single piece, high-impact plastic cover.

2.03 HORIZONTAL HEADWALL

A. Acceptable Manufacturers & Products:

1. Hill-Rom, Batesville, IN (Model # Uniflex 1000)
2. The Headwall Company, Oklahoma City, OK
3. Amico Corporation, Amityville, NY

B. Description:

1. The Headwall System shall be a single-tier horizontal raceway mounted to the headwall behind the patient bed at a specified level. These raceways provide the following functions:
 - a. A raceway for placement of electrical devices, low voltage devices, communications & medical gas outlets
 - b. Physical structure for supporting ancillary equipment
 - c. Raceway for routing plumbing external of the headwall for fixed gases
2. The vertical frame sections shall include a precision alignment mechanism that insures proper positioning of horizontal rail and channel components. Vertical frame sections shall become an integral part of the building wall.
3. Horizontal channels shall be continuous length, as shown on Lab Drawings, and shall be field attached to the horizontal rail and vertical frame sections. Channel fasteners shall be concealed behind a snap-in vinyl trim. The lower channel surface shall be flat and smooth to facilitate ease of cleaning. Channels shall be removable to allow replacement as necessary. Finish shall be powder coated.
4. Horizontal Channel Accessories shall be available as manufacturer's standard in a sufficient variety to meet the needs of typical hospital applications. A horizontal channel bracket that automatically locks in place shall be provided. The bracket shall include a plastic locking pad to protect the surface finish of the channel and shall be designed for one hand operation.
5. The horizontal component rail shall be designed to accept standard depth components such as medical gas outlets, clocks, electrical plugs, and light switches, as shown on Lab Drawings.

C. Construction:

1. Horizontal component rail: Heavy gauge anodized aluminum profiles with a removable horizontal accessory channel.
2. Channels shall have a powder coated finish.
3. Component fascia. Aluminum or steel with a high pressure laminate finish. Device plates shall be powder coated.

D. Electrical:

1. Wiring line voltage: Each vertical frame section shall be completely pre-wired with service connections terminating above the accessible ceiling line or as otherwise indicated on the contract drawings.
2. Low Voltage Provisions: Provisions for low voltage communication devices shall consist of back boxes or barriered compartments. Communication devices and wiring shall be

supplied and installed by others. Refer to Lab Drawings for type and quantity of required devices.

3. Devices Hospital grade power receptacles, ground jacks switches, etc. shall be as indicated on contract drawings.

E. Medical Gas:

1. Piping: Medical gas outlets shall be pre-manifolded using Type "L" copper and shall terminate near the top of each vertical frame section or as otherwise indicated on contract drawings. Piping fittings and brazing procedure shall be in accordance with NFPA 99. All joints shall be made with a silver brazing alloy with a melting point of at least 1000 degrees. Tubing ends shall be securely capped and properly identified. To prevent galvanic corrosion, all copper tubing shall be protected from contact with dissimilar materials.
2. Medical Gas Outlets: Outlets shall be manufacturer's standard brand. Type and style shall be as called for in the contract drawing.

F. Other Services:

1. Provide blank openings with face plates for future expansion of services, as indicated on Lab Drawings. Openings shall be one gang.
2. Where indicated on drawings provide complete "dummy" service outlets without connection to wiring and piping. The outlets shall be the same as in locations where the service outlets will be connected to wiring and piping.

G. Provisions For Equipment By Others

1. An appropriately sized conduit and compartment shall be provided for the installation of microphone and its associated wiring.

2.04 ACCESSORIES

- A. All headwalls shall have a horizontal channel or vertical track, making organization easy and convenient. All accessories shall be provided with all required mounting hardware and adapters.
- B. Refer to Lab Drawings for quantity and location or required accessories. Accessories shall include:
 1. Universal Holders for otoscopes, ophthalmoscopes, and thermometers.
 2. Tilt Swivel Monitor Arm
 3. Sharps Container and Mounting Bracket Assembly
 4. Manual Resuscitation Holder
 5. Glove Box Holder
 6. L-Bracket and Basket for aneroid manometer
 7. I.V. Trees
 8. Utility Shelves
 9. Large Storage Basket

2.05 FASTENERS AND ANCHORS

- A. Fasteners and Anchors: Size and type to securely fasten and anchor items to substrates and supporting structure.
- B. Provide miscellaneous fillers and panels required for a finished installation.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements applicable to this and all other Laboratory Equipment Specification Sections including, but not limited to, examination, installation, adjusting, cleaning, and protection requirements, refer to Specification Section 11600 - Laboratory Equipment - General Requirements
- B. The headwall manufacturer shall examine and test each unit for compliance with specification requirements. Such inspections as set forth in this specification or otherwise necessary shall be performed to insure that the equipment conforms to specifications.

3.02 ADDITIONAL INSTALLATION REQUIREMENTS

- A. Site Verification of Conditions: Verify that temperature and humidity at site comply with manufacturers written requirements.
- B. Install in accordance with manufacturer's instructions.
- C. Install in accordance with codes, regulations and standards required by the authority having jurisdiction.
- D. Verify that field measurements are as shown on shop drawings.
- E. Verify that mechanical, electrical, and other items affecting work of this section are in place and ready to receive the work.
- F. Interface with Other Work. Install items in a sequence to not delay work.
- G. Site Tolerances: Install wall-to-wall countertops with a maximum 1/4 inch gap.
- H. The manufacturer of the headwalls and power columns shall supply a conduit drop template for proper location & orientation of conduit & piping drops
- I. Mounting hardware and instruction shall be furnished by manufacturer.

3.03 FIELD CERTIFICATIONS

- A. Perform Field Certifications: See Part 1- General of this specification section for Field Certifications required.

- B. After installation, equipment shall be examined and tested by installing contractor under operating condition to determine that each component of the assembly has been installed correctly and functions properly.

3.04 DEMONSTRATION

- A. Demonstration and Instruction of Owner's Personnel: Provide in accordance with Division 1.
- B. Demonstrate all equipment operations, functions and field certification process. Supply instructional materials.
- C. Make available to Owner's employees.

END OF SECTION 11680

SECTION 12309 - LABORATORY SERVICE FIXTURES

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessories, necessary to furnish, deliver and install:
 - 1. Domestic Hot And Cold Water Fixtures
 - 2. Laboratory Gas Fixtures
 - 3. Electrical Service Fixtures
 - 4. Data Service Fixtures
 - 5. Fume Hood Service Fixtures
 - 6. Emergency Shower/Eye Wash
- B. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- C. For general requirements applicable to this and all other Casework Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.
- D. Products Specified But Not Installed Under This Section:
 - 1. Section 12345 - Metal Laboratory Casework and Fume Hoods: Factory installation of laboratory service fixtures in fume hoods
- E. Related Sections:
 - 1. Section 12340 - Laboratory Casework - General Requirements
 - 2. Section 12345 - Metal Laboratory Casework and Fume Hoods: Fixture mounting holes
 - 3. Section 12346 - Wood Laboratory Casework: Fixture mounting holes
 - 4. Division 15 - Mechanical: Connection of laboratory service fixtures to service lines
 - 5. Division 16 - Electrical: Connection of laboratory service fixtures to service lines

1.02 CERTIFICATIONS

- A. Provide certification for each item, that the products provided have been evaluated by the National Recognized Testing Laboratory (NRTL) to the applicable ANSI/UL and CSA Standards, for use in the US.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For general requirements applicable to this and all other Casework Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements

2.02 MANUFACTURED UNITS

A. Plumbing Fixtures:

1. Heavy duty special design manufactured for laboratory use
2. Provide with mounting shank of length and type suitable for substrate condition, lock nut, and other mounting devices necessary for attachment to countertops, backsplashes, and panels
3. Factory assemble fixtures with valves and mounting shanks
4. Individually factory pressure-tested
5. Fixture shipment: Provide fixtures loose, except for factory-mounted fixtures in fume hoods specified in Section 12345
6. Fabricate to accommodate index coding
7. Provide fixtures with colored service identification:
 - a. Fitting handles: Color coded plastic hooded handles with index buttons mounted in handle.
 - b. Identify services with lettered and color-coded buttons:

Domestic hot water:	HW	Red
Domestic cold water:	CW	Green
Laboratory compressed air:	A	Orange
Laboratory (natural) gas:	G	Blue
Laboratory vacuum:	V	Yellow
Nitrogen	N	Brown
Ultra-pure water:	DI	White

2.03 DOMESTIC HOT AND COLD WATER FIXTURES

A. Acceptable Manufacturers:

1. Water Saver Faucet Company, Chicago, IL
 - a. H&CW Deck Mounted Hot and Cold Water Faucet with 8" swing type gooseneck with vacuum breaker - Model No. L412-8VB
 - b. H&CW Deck Mounted Hot and Cold Water Faucet with 8" swing type gooseneck with vacuum breaker and wrist blade handles for ADA - Model No. L412-8VB-BH
 - c. CW Deck Mounted Cold Water Faucet with 6" rigid type gooseneck with vacuum breaker for cupsinks - Model No. L411-6VB
 - d. CW Deck Mounted Cold Water Faucet with 6" rigid type gooseneck with vacuum breaker and wrist blade handles for ADA cupsinks - Model No. L411-6VB-BH
 - e. H&CW Wall Mounted Hot and Cold Water Fitting with vacuum breaker and Quick-Disconnect, ADAAG compliant, for ADA cart. See Lab Drawings.
 - 1) Flange body for fixed casework panel:

B-QC6-F-6PM-K3	(CW)
B-QC6-F-6PM-K6	(HW)
 - 2) Quick connect stem:

B-QC6-D-6PM-K3 (CW)

B-QC6-D-6PM-K6 (HW)

2. Chicago Faucets, Des Plaines, IL
3. Kewaunee Scientific Corporation, Statesville, NC

B. Description:

1. Design for maximum operating water pressure of 550 kPa (80 psi).
2. Made of chrome plated brass with an 8" spread swing gooseneck.
3. Removable straight serrated hose connector.
4. Provide with integral vacuum breaker on goosenecks to prevent backflow. Vacuum breakers shall be designed specifically for laboratory applications. As such, they shall be design to seal properly and prevent spillage under extreme low flow conditions.
5. Valves shall be disc type with renewable internal assemblies.
6. Provide forged brass wrist-blade handles with colored plastic index disk at ADA sinks.
7. Forged brass four-arm handle for ease of gripping and turning. Furnished with full view color-coded index disc secured with cement.
8. Individually factory test prior to shipment.
9. All faucets shall meet the requirements of ANSI/ASME A112.18.1M.
10. Vacuum breakers shall be certified by the American Society of Sanitary Engineers (ASSE) under ASSE Standard No. 1001.

2.04 LABORATORY GAS FIXTURES

A. Acceptable Manufacturers:

1. Water Saver Faucet Company, Chicago, IL
 - a. Deck-Mounted Fixtures with removable serrated hose ends
 - Single Outlet Turret Model No. L4200FH-131WS
 - Two-way 90° Angle Outlets Turret Model No. L4200FH-132AWS
 - b. Wall Mounted Fixtures and Quick-Disconnect, ADAAG compliant, for ADA cart. See Lab Drawings.
2. Chicago Faucets, Des Plaines, IL
3. Kewaunee Scientific Corporation, Statesville, NC

B. Description:

1. Laboratory Ball Valves:
 - a. On/off control of gas at pressures up to 75 psi.
 - b. Valve Body: Forged brass with polished chrome plated finish.
 - c. Valve Unit: Quarter-turn open/close with chrome plated brass ball and molded TFE seals.
 - d. Handle: Forged Brass lever handle with color-coded index disc to indicate service.
2. Hose end:
 - a. Removable, serrated, non-slip
 - b. Straight, unless otherwise indicated
 - c. Quick disconnect at wall mounted laboratory fixtures
3. Provide with cylindrical turret with single or double outlets, as shown on drawings.

4. Provide ADA compliant lever handle at ADA workstations.
5. Fixture shall be fully assembled and factory tested prior to shipment.

2.05 ELECTRICAL SERVICE FIXTURES

- A. All electrical outlets to be provided under Division 16 – Electrical, unless noted otherwise.
- B. Single Faced Pedestals (E4):
 1. Provide deck mounted, single faced, single wide, stainless steel pedestals.
 2. Provide pedestals complete with enclosure boxes, receptacle, and stainless steel cover plates.
 3. Provide Ground Fault Interrupter Receptacles where required.

2.06 DATA SERVICE FIXTURES

- A. All data outlets to be provided under Division 27 – Telecom/Cabling Systems, unless noted otherwise.
- B. Double Faced Pedestals (D2, D4):
 1. Provide deck mounted, double faced, single wide, stainless steel pedestals.
 2. Provide data pedestals complete with enclosure boxes and stainless steel cover plates.

2.07 FUME HOOD SERVICE FIXTURES

- A. Acceptable Manufacturers:
 1. Kewaunee Scientific Corporation, Statesville, NC
(Model numbers indicated below are by WaterSaver unless noted otherwise)
 - a. Remote Control Cold Water Fixture
Model No. W-0740-L/R-CW-I-X
 - b. Remote Control ADA Compliant Cold Water Fixture
Model No. W-0740-L/R-CW-I-X
 - c. Remote Control Laboratory Gas Fixtures
Model No. L4285B-L/R-GAS
 - d. Remote Control ADA Compliant Laboratory Gas Fixtures
Model No. L4285B-L/R-GAS
 - e. Electrical Fixtures for mounting in Fume Hoods
Model No. 0581-1V-I
Toggle Switch for Fume Hoods
Model No. 0655-1V-I
 2. Chicago Faucets, Des Plaines, IL
 3. Water Saver Faucet Company, Chicago, IL
- B. Remote Control Cold Water Fixtures:
 1. Design for maximum operating water pressure of 147 psi
 2. Front loaded fittings including brass valve with replaceable seat, nylon color coded panel flange
 3. Cold Water Swing Type Gooseneck with serrated end.

4. Fume Hoods shall be pre-piped as specified in Section 12345

C. Remote Control Laboratory Gas Fixtures:

1. On/off control of gas at pressures up to 100 psi
2. Remote control laboratory ball valve with extension rod, guide plate, and handle for gas services. Valve shall be certified for gas services by the American Gas Association (AGA).
3. Fume Hoods shall be pre-piped as specified in Section 12345

D. Remote Control ADAAG Compliant Laboratory Gas Fixtures:

1. Remote control laboratory ball valve with extension rod, guide plate, and handle for gas services. Valve shall be certified for gas services by the American Gas Association (AGA).
2. Valve shall be factory assembled and tested at 125 psi. Maximum working pressure shall be 100 psi
3. Valve shall be suitable for gas services
4. Fume Hoods shall be pre-piped as specified in Section 12345
5. Provide ADAAG compliant lever handle

E. Electrical Fixtures:

1. Fume Hoods shall be pre-wired as specified in Section 12345

2.08 BARRIER-FREE RECESSED SAFETY STATION WITH DRAIN PAN

A. Acceptable Manufacturers:

1. Water Saver Faucet Company, Chicago, IL (Barrier Free Recessed Safety Station with Drain Pan - Model No. SSBF2150)
2. Chicago Faucets, Des Plaines, IL
3. Guardian Equipment, Chicago, IL

B. Description:

1. Shower Head: 10 inches. Spray pattern shall be 20 inches diameter at 60 inches above floor. Furnished with stainless steel vertical supply pipe and ceiling escutcheon for mounting shower head at desired height below finished ceiling.
2. Valve: 1 inch IPS stainless steel stay-open ball valve with stainless steel "panic bar". Pulling bar down shall activate shower; shower shall remain in operation until bar is returned to original closed position. Furnished with stainless steel access panel and 1" IPS unions for valve.
3. Cover /Drain Pan: Eye/face wash section of unit shall have stainless steel cover. Opening cover shall pull outlet head assemble down from vertical to horizontal position and shall activate water flow. Horizontal grab bar shall be easily grasped and pulled in an emergency. While unit is in operation, waste water shall be collected by drain pan and returned into unit for drainage. Unit shall remain in operation until cover is returned to closed position.

4. Eye/Face Spray Head Assembly: Two spray heads mounted on supply arms. Each spray head shall have internal flow control and filter to remove impurities from water.
5. Eye/Face Wash Valve: ½" IPS brass stay-open ball valve.
6. Mounting: Entire unit shall be enclosed in an 18 gauge stainless steel cabinet with flanged rim for recessed mounting in wall. Combination cover and drain pan shall be 18 gauge stainless steel. Unit shall fit in standard 3 5/8" deep wall
7. Pipe and Fittings: All pipe and fittings shall be stainless steel or brass.
8. Individually factory test prior to shipment.
9. ANSI-compliant identification sign.
10. Comply with the requirements of ANSI Z358.1 for eyewash equipment

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements, applicable to this and all other Casework Specification Sections including, but not limited to, examination, installation, adjusting, cleaning, and protection general requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.

3.02 ADDITIONAL INSTALLATION REQUIREMENTS

- A. Install in accordance with specifications
- B. Install items plumb, level and square
- C. Maintain dimensional tolerances and alignment with surrounding construction and adjacent surfaces
- D. Interface With Other Work. Install items in a sequence to not delay:
 1. Adjoining construction
 2. Connections of casework and hoods to mechanical and electrical services

3.03 SCHEDULES

- A. Quantities are indicated on Drawings, unless otherwise indicated.

END OF SECTION 12309

SECTION 12340 - LABORATORY CASEWORK - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. The casework contractor shall furnish and install all products specified herein and in the complete casework package. The complete casework package consist of the following specification sections:
 - 1. Section 12309 - Laboratory Service Fixtures
 - 2. Section 12340 - Laboratory Casework - General Requirements
 - 3. Section 12345 - Metal Laboratory Casework and Fume Hoods
 - 4. Section 12346 - Wood Laboratory Casework
- B. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessories, necessary to furnish, deliver and install:
 - 1. Epoxy Resin Countertops, Back Splashes, Sinks and Cup Sinks
 - 2. Peg Boards
 - 3. Hardware and Trim
- C. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- D. This Section also includes all general requirements, applicable to this and all other Casework Specification Sections including, but not limited to:
 - Definitions
 - System description
 - Scope
 - Submittals
 - Quality assurance
 - Mock-up
 - Testing
 - Field measurements
 - Pre-installation conference
 - Delivery, storage and handling
 - Project conditions
 - Sequencing
 - Materials
 - Components
 - Finish and performance requirements
 - Examination, Installation, Adjusting, Cleaning and Protection Requirements
- E. Related Sections:
 - 1. Division 6 - Rough carpentry, blocking within walls to adequately support casework.
 - 2. Division 7 - Sealants.

3. Section 11600 - Laboratory Equipment - General Requirements: Equipment Schedule.
4. Division 15 - Mechanical: service lines, plumbing connections, drains, traps, overflows, strainer, tailpieces, and fittings, ductwork, blowers, fume hood fans, and air flow monitors.
5. Division 16 - Electrical: Service lines, electrical rough-in, connections, receptacles, and covers.

1.02 DEFINITIONS

A. Service Fixtures:

1. Plumbing Service Fixtures: Gas cocks; ball turrets; hot, cold, and ultra-pure water gooseneck faucets; remote control valves; safety eyewash; shower heads; and other fittings.
2. Electrical Service Fixtures: Electrical convenience outlet boxes, electrical and data pedestals, single or duplex receptacles, switches: etc.
3. Other items which serve as functional part of equipment.

B. Service Lines:

1. Gas piping; hot and cold water piping; drain and vent lines; fittings; and control and shut off valves; to carry respective services from building roughing-in floors and walls through equipment to service fixtures.
2. Conduit, junction boxes, conduit fitting, wire disconnect switches, fuses, and circuit breakers, to carry electrical services from building roughing-in outlets in floors, and walls through equipment to service fixtures.

C. Exposed:

1. As used in this Specification Section, "exposed" portions of woodwork include surfaces visible when doors and drawers are closed. Bottoms of woodwork more than 4 feet above finish floor are considered exposed. Visible surfaces in open casework or behind clear doors also are considered as exposed.

D. Semi-Exposed:

1. As used in this Specification Section, "semi-exposed" portions of woodwork include those members behind opaque doors, such as shelves, divisions, interior faces of ends, case backs, drawer sides, backs and bottoms, and back face of doors. Tops of cases 6'-6" or more above finish floor shall be considered semi-exposed. Bottoms of woodwork less than 4 feet above finish floor are considered semi-exposed. Semi-exposed portions of woodwork shall be of same species, color and finish as the "exposed" portions.

1.03 SYSTEM DESCRIPTION

A. Design Requirements:

1. Manufacturer is responsible for:
 - a. Designing, engineering, fabricating, and installing system
 - b. Anchorage to structure
 - c. Modifications to meet specified requirements and maintain visual design concepts
2. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and unit profiles.
3. Provide concealed fastening wherever possible.

4. Attachment considerations: Account for site peculiarities, expansion and contraction movements, so there is no loosening, weakening, and fracturing, of connections between units and substrate.
5. Comply with UL 544 for electrically powered equipment.

B. Interface With Adjacent Systems:

1. Coordinate with mechanical service lines and ductwork.
2. Coordinate with electrical service lines.

1.04 SCOPE

- A. Furnish and install all cabinets and casework, including tops, ledges, supporting structures, fume hoods, laboratory sinks, cup sinks, and miscellaneous items of equipment as listed in these specifications, including delivery to the building, setting in place, leveling, scribing to walls and floors as required. Furnishing and installing all filler panels, knee space panels and scribes as shown on drawings.
- B. Furnish and deliver all utility service outlet accessory fittings, as listed in these specifications or as shown on drawings as mounted on the laboratory furniture. The above defined items shall be furnished unassembled with supply tank nipples and lock nuts, not attached, loose in boxes and properly marked for delivery to the mechanical contractor. All plumbing fittings shall be packaged separately and properly marked for delivery to the appropriate contractor.
- C. Furnish and deliver, packed in boxes for installation by the mechanical contractor, all drain troughs, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment or listed in the specifications, or shown on the drawings. Integral tailpieces when required shall be in accordance with the manufacturer's standards. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system.
- D. Furnish service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the details.

1.05 SUBMITTALS

A. Product Data:

1. Submit manufacturer's descriptive literature and product specifications for each product.
2. Include data to indicate cabinet construction.
3. Include information for factory finishes, chemical resistance ratings, hardware, glass, sealants, accessories, and other required components.

B. Shop Drawings:

1. Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
2. Indicate typical casework and countertop layout including dimensioned floor plans, sections and elevations, and service fixture holes locations.

3. Indicate enclosures, cabinets, hardware, service fixtures complete with numbers and item names, and details including construction kinds of cabinets, countertops, process tables, and other components.
4. Submit detail drawings of special accessory components not included in manufacturer's product data.
5. Indicate joints in countertop material.
6. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

C. Samples:

1. Work Surface Samples:
 - a. One sample of all top materials shown or called for, of sufficient size to perform finish requirement tests
 - b. Two pieces sealed and joined. Full depth of counter and 6 inches from each side of joint
2. Wood Finish Samples:
 - a. Include manufacturer's full range of samples for Architect's selection.
 - b. Size: 3" x 5"
3. Metal Casework Color Samples:
 - a. Include manufacturer's full range of colors for Architect's selection.
 - b. Architect will select casework components' color with no change in contract sum.
 - c. Provide sample of colors, as selected by Architect, on same metal from which casework will be fabricated
 - d. Size: 6" x 6"
4. Sample of all laboratory service fittings, locks, door pulls, hinges, and interior hardware.

D. Certification: Submit certifications specified in Quality Assurance article.

E. Qualification Data:

1. Submit manufacturer's and installer's qualifications verifying years of experience.
2. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.

F. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

G. Warranty:

1. Submit specified warranty in accordance with Division 1.
2. Warrant installed casework to be free from defects in material and workmanship for 1 year from date of substantial completion.
3. Warrant casework and components to be corrosion free for 3 years from date of substantial completion.
4. Include coverage against defects, which may arise during the warranty period except those which are caused by misuse.

1.06 QUALITY ASSURANCE

- A. Single Source Responsibility:
 - 1. Furnish units from one manufacturer for entire Project, unless otherwise acceptable to Architect.
 - 2. Provide casework modules as complete units, including countertop hardware, glazing, service fixtures and accessory items necessary for proper function.
 - 3. Provide each fume hood as complete units, including service fixtures specified in Section 12309 and accessory items necessary for operation.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section.
- C. Installer Qualifications: Acceptable to fabricator with documented experience on at least 5 projects of similar nature in past 5 years.
- D. Regulatory Requirements: Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.

1.07 PERFORMANCE REQUIREMENTS

- A. Base cabinets shall be constructed to support at least a uniformly distributed load of 200 lbs. per square foot of cabinet top area, including working surface without objectionable distortion of interference with door and drawer operation.
- B. Base cabinet corner gussets with leveling bolts shall support 500 lbs. per corner, at 1-1/2" projection of the leveling bolt below the gusset.
- C. Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 40 lbs. per square ft. up to a maximum of 200 lbs., with nominal temporary deflection, but without permanent set. These requirements apply to all shelves including, but not limited to wall mounted shelves, shelves at island benches, and shelves inside cabinets.
- D. Drawer construction and performance shall allow 13-5/8" clear when in an extended position and suspension system shall prevent friction contact with any other drawer or door during opening or closing. All drawers shall operate smoothly, a minimum of 10,000 cycles with an evenly distributed load of 150 lbs.
- E. Swinging doors on floor mounted casework shall support 200 lbs. suspended at a point 12" from hinged side. Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.
- F. Utility Tables (4 legged) shall support 300 lbs. per square foot

1.08 MOCK-UP

- A. General: Comply with provisions of Division 1.
- B. The laboratory furniture manufacturer shall erect a laboratory furniture mock-up, in the location indicated by the Architect. All components utilized shall meet the requirements of the Drawings and Specifications.

- C. The manufacturer shall make adjustments necessary to meet minimum performance requirements and testing criteria specified, and obtain acceptance from Owner's Representative. Modifications to the mock-up shall be incorporated into the overall design of the project without change in contract sum. Do not proceed with shop fabrication or project installation until mock-up has been accepted by Architect.
- D. Accepted mock-up establishes minimum performance standards and quality for workmanship and materials for the Project. Mock-up shall remain in designated location until all furniture is installed and approved by the Owner's Representative. Approved mock-up will be incorporated into the project.

1.09 TESTING

- A. The laboratory furniture manufacturer shall be required to submit with their bid certified test reports on the laboratory casework finish, all work top materials to be furnished, and hoods. These test reports shall be performed by an independent nationally recognized testing laboratory and shall certify that the materials to be supplied will conform to the requirements of these specifications as well as testing procedures. Failure to include these test reports with the bid might be cause for rejection of the bidder and of the bid proposal.

1.10 FIELD MEASUREMENTS

- A. It is the laboratory furniture manufacturer's responsibility to verify all field measurements and that all equipment will fit through entry ways, corridors and door openings enabling a smooth flow of equipment to its proper location in the building.
- B. Drawings show arrangement and location of casework. If it is necessary to vary from arrangement shown, because of structural, mechanical, electrical or other considerations make such variations only after approval of Architect and at no additional expense to Owner.
- C. Measure all recesses and openings at buildings and provide all trim pieces, fillers, and closures, in sizes required.

1.11 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference in accordance with Division 1.
- B. Convene pre-installation conference one week prior to commencing work of this Section.
- C. Attendance Required: Owner, Architect, Contractor, Manufacturer's Representative, and Installer.
- D. Agenda: Discuss and agree upon acceptable substrate and support conditions, preparatory work, interface with mechanical and electrical services, and methods of installation and testing.

1.12 PROJECT CONDITIONS

- A. Environmental Requirements: Comply with manufacturer's written requirements for installing sealants.
- B. Do not deliver or install casework until the following conditions have been met:
 - 1. Windows and doors are installed and the building is secure and weather-tight.

2. Ceiling, overhead ductwork and lighting are installed.
3. All painting is completed and floor tile is installed.
4. Do not deliver or install wood product until Interior building temperature is maintained between 65 and 80 degree F, and ambient relative humidity maintained between 25% and 55% prior to delivery, and during and after installation. Frequent and/or excessive changes in temperature and/or humidity levels during casework installation, or once casework is installed, must be avoided to prevent damage to materials.

1.13 SEQUENCING

- A. Sequence work under provisions of Division 1.
- B. Coordinate with plumbing rough-in requirements specified in Division 15.
- C. Coordinate with mechanical requirements specified in Division 15.
- D. Coordinate with electrical rough-in requirements specified in Division 16.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. The specific requirements shown and specified are indicated to establish a standard of design and quality for materials, construction, size and workmanship.
- B. Dimensions, voltages, electrical power requirements, and utility connections are based on the items specified. Contractor is responsible for all costs for dimensional adjustments and for providing or arranging for additional electrical or utility services or equipment required as a result of using an equal product.
- C. Acceptable Manufacturers. As noted for individual sections and as follows:
 1. Kewaunee Scientific Corporation, Statesville, NC
 2. Advanced Lab Concepts (ALC), Austin, TX
 3. Jamestown Metal Products, Inc., Jamestown, NY
 4. Lab Crafters, Ronkonkoma, NY
- D. The Naming of manufacturer(s) and designation of product(s) is for the purpose of identifying and describing required product and not to limit competition. Other manufacturers capable of producing the same appearance and having the same quality, durability, and performance may be proposed for use on this project subject to Architect's approval.
- E. Other approved manufacturers are responsible for all adjustments required to fit their products to the work at no additional cost.

2.02 MATERIALS

- A. Solid Wood:
 1. Exposed solid wood: Maple hardwood lumber, clean and free of defect.

2. Interior solid wood: Maple hardwood lumber, clean and free of defect.
 3. All lumber kiln dried to uniform moisture content of six percent.
- B. Exterior Plywood:
1. Maple and hardwood (Maple faced poplar) Plywood: Balanced construction of cross and face plies glued with water resistant resin glue.
 2. Maple Veneer: Plain sawn maple veneer, grade A, on all exposed faces. Vertically matched.
- C. Interior Plywood:
1. All interior plywood used in cabinets and cases, unexposed, shall be of same species and color as exterior plywood. All interior plywood shall have high grade, clear veneers and assembled with poly-vinyl emulsion glue. All interior unexposed shelves shall be 7-ply hardwood plywood, maple banded.
- D. Glue: Type 2 or Type 3 water resistant glue.
- E. Wood Finish: Highly chemical resistant catalyzed vinyl varnish finish with "blocker" additive to resist fading from sun light.
- F. Edgebanding: 1/8" hardwood on all edges of doors and drawers; fronts of shelves, base, wall, upper and tall cases.
- G. Epoxy Resin:
1. Modified epoxy resin compounded and cured for optimum physical and chemical resistant properties.
 2. Uniform mixture throughout full thickness.
 3. Non-glaring sheen.
 4. Color: Black.
 5. Countertop and back splash thickness: 1 inch.
 6. Slab flatness: No gap exceeding 0.09 inches in 96 inch span, measured in an unrestrained condition.
- H. Glass:
1. Type: Laminated safety glass.
 2. Color: Clear.
 3. Thickness: 1/4 inch nominal
 - a. Outer light: 1/8 inch
 - b. Plastic innerlayer: 0.030 inch polyvinylbutyral, clear
 - c. Inner light: 1/8 inch
- I. Epoxy Resin Cement:
1. Suitable for use in joining sections of epoxy resin countertop, backsplashes, and sinks.
 2. Sufficient adhesion properties at temperatures 40 degrees to 100 degrees Fahrenheit for permanently anchoring epoxy resin countertops to base cabinets.

3. Chemical resistance equal to that specified for epoxy resin countertops and sinks.
 4. Loss of hardness and adhesion properties at temperatures in excess of approximately 140 degrees Fahrenheit.
- J. Silicone Sanitary Sealant: Comply with requirements specified in Division 7.
- K. Galvanizing Touch-up Paint: SSPC Paint 20.
- L. Sheet Carbon Steel:
1. ASTM A568.
- M. High Strength low-alloy steel.
1. Cold rolled, drawing quality, patent beveled and re-squared.
 2. Capable of structurally developing required strength and rigidity for each component part.
 3. Lead coated or treated with phosphate conversion coating.
- N. Sound Deadening: Heavy bodied resinous coating, with resilient filler material, compounded for permanent, non-flaking adhesion to metal in 1/8 inch thick coating.

2.03 COMPONENTS

- A. Epoxy Sinks:
1. Material: Epoxy Resin.
 2. Construction: Taper side of sink. Inside corners radiused. Pitch bottom of sink to drain.
 3. Size: See drawings.
 4. Epoxy Sink Supports: Steel channels attached to sink cabinet ends and screw type adjustable rods to insure tight fit to underside of table with a water-proof compound.
 5. Seal around drain with silicone sealant as recommended by epoxy sink manufacturer, and as specified in Division 7.
 6. Where indicated in the drawings, provide cup sinks complete with removable type 316 stainless steel wire screen.
- B. Sink Strainer, Overflows, and Tailpieces:
1. Sink strainer, overflows, and tailpieces:
 - a. Epoxy Sinks: Polypropylene. Coordinate tailpiece termination with service line connection requirements.
 - b. Stainless Steel Sinks: See Division 15.
- C. Epoxy Resin Countertops and Back Splashes:
1. Fabricate from epoxy resin unless otherwise noted in drawings.
 2. Provide back splashes at rear of countertop and on end returns where indicated; notched as required.
 3. Fabricate to install without field cutting or drilling. Drill holes in counter for laboratory service fixtures as scheduled in Section 12309.
 4. Seal gap between back splash and wall with acrylic latex sealant specified in Division 7.

5. Joint between segments of tops and back splashes:
 - a. Smooth, even, and level with no raised edges
 - b. Width: 1/8 inch maximum
 - c. Seal watertight with modified epoxy resin cement
6. Epoxy Resin countertops:
 - a. Cut to size of cabinet or knee space below, where indicated on drawing. Where no indication is made, countertops lengths shall be at Contractor's option with termination points at base cabinet or knee space edges.
 - b. Do not cut to be smaller than 24 inches wide.
 - c. Fabricate with drip grooves on underside of exposed edges.
 - d. Fabricate exposed edges of base sections of countertops with a 1/4 inch chamfer on front top edge, square bottom edge, and vertical corners; fabricate other countertop edges with square tops and bottoms.
 - e. Bond back splash to surface of countertop to form square joint.
 - f. Back splash to be 4 inches high, unless otherwise noted on Drawings.

D. Peg Boards:

1. Constructed of modified epoxy resin.
2. Thickness: 1 inch.
3. Color: Black for full thickness to match adjacent counter tops.
4. Polish front surface, back surface, and edges.
5. Fabricate with:
 - a. Removable round-tip polypropylene peg section. Omit bottom row as required to avoid conflict with faucets.
 - b. Stainless steel drip trough with 1/4 inch diameter outlet below peg area.
 - c. Flexible clear tubing between drip trough outlet and sink (cut as required).
6. Mechanically fasten drip trough to pegboard and continuously seal with sanitary silicone specified in Division 7 at top edge.

E. Hardware and Trim:

1. Drawer and Door Pulls:
 - a. Drawer and door pulls shall be satin finish stainless steel wire pulls, and shall be securely fastened to doors and drawers with vandal-proof screws. Two pulls shall be required on all drawers over 24 inches long. Drawer pulls shall be mounted horizontally. Door pulls shall be mounted vertically.
2. Drawer Suspension:
 - a. Provide self-closing, full-extension, heavy duty drawers' suspension. Loading capacity of 150 lbs.
3. Drawer Stops:
 - a. Provide on drawers to prevent inadvertent removal.
4. Hinges:
 - a. Hinges shall be the five (5) knuckle institutional, wrap-around full overlay design for all swinging doors. Hinges shall be 2-1/2" long, one (1) pair for doors under 4 ft in height and 1-1/2 pair on doors over 4 ft in height. Hinges shall be mounted with flathead screws, so applied to door and cabinet to withstand a weight load of 150 lbs. minimum. All hinges shall be satin finish stainless steel.
5. Locks:

- a. Locks shall be a National lock, disk tumbler with interchangeable cylinder. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity of at least 1000 primary key changes.
 - b. Provide locks where noted on lab plans.
 - c. Keying:
 - 1) Key locks individually; two keys per lock.
 - 2) Master key locks by building; two master keys.
6. Roller Catches:
- a. Roller catches shall be used on swinging doors. Catches shall have a spring-loaded polyethylene roller and provided with a steel strike plate. Double-doors, without looks shall have a catch on each door. Full height cases shall have latching devices located on the structurally fixed center shelf. The left hand door shall have a positive catch and the right hand door shall have the roller type catch.
7. Elbow Catches:
- a. Elbow catches and strike plates shall be used on left hand doors of double door cases and are to be cast aluminum with bronze finish.
8. Leg Shoes:
- a. Leg shoes shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Shoes shall be 2-1/2" high and a pliable, black vinyl material. Use of a leg shoe which does not conceal leveling device will not be acceptable.
9. Shelf Support Clips:
- a. Shelf support clips for wood casework shall be pin type for mounting on interior of cabinet work. Clips shall be corrosion resistant and shall retain shelves from accidental removal. Shelves shall be adjustable on 1-1/4" centers. Surface mounted metal support strips and clips subject to corrosion are not acceptable.
10. Fasteners and Anchors:
- a. Size and type to securely fasten and anchor items to substrates and supporting structure.

2.04 FINISH AND PERFORMANCE REQUIREMENTS

A. Wood Finish and Performance Requirements:

- 1. Wood Finish:
 - a. Prior to application of the wood finish, case and cabinet surfaces shall be smoothly sanded to remove loose fibers, scratch marks and abrasions, with all dust thoroughly removed by compressed air.
- 2. Wood Finish Application:
 - a. Finishes shall be applied under controlled atmospheric conditions, and shall be cured after application in a modern humidified oven humidified at 140° F and 30%- relative humidity.
- 3. Wood Casework Finish (Interiors):
 - a. Interior surfaces and unexposed exteriors shall receive a double-pass coat of resinous wood sealer.
- 4. Wood Casework Finish (Exteriors):
 - a. Case and cabinet exposed exterior surfaces, including interiors of glazed cases and open shelving, shall be provided with an acid, alkali, solvent, water and abrasion resistant finish. Surfaces shall be first coated with a non-fiber lifting

stain, or toner to secure the desired color. The color coat shall be thoroughly dried. The first sealer coat shall be applied, thoroughly dried, sanded and carefully dusted. A second sealer coat shall be applied and thoroughly dried. A double pass coat of chemical resistant synthetic varnish shall then be applied and thoroughly dried, providing a semi-gloss finish. The completed case and cabinet exterior finish shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS.

5. Performance Test Rating: Terms referred to in PERFORMANCE TEST RESULTS are as follows:
 - a. "A" (Excellent) - Indicates excellent to superior integrity of finish film. Includes no effect to slight allowable change in gloss (dulling or increase in gloss) and slight discoloration.
 - b. "B" (Good) - Indicates good to very good integrity of finish film. Allows change of gloss or discoloration. Any effect can be removed from the tested area by abrading with 325-mesh silica powder and water, indicating that the discoloration is only superficial and that the finish film is good below the surface.
6. Performance Test Results (Chemical Spot Tests):
 - a. Chemical spot tests shall be made by applying 5 drops of each reagent to the surface to be tested. Each reagent (except those marked **) shall be covered with a 1-1/4" dia. watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked ** shall be tested as follows: A 1" ball of cotton shall be saturated with solvent and placed on the surface to be tested. The cotton ball shall then be covered by an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° F +/- 3° F. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

Reagents	Time In Minute	Test Ratings
Acetone**	60	A
Ammonium Hydroxide, 28%	60	A
Benzene**	60	A
Carbon Tetrachloride**	60	A
Ethyl Acetate**	60	A
Ethyl Alcohol**	60	A
Ethyl Ether**	60	A
Gasoline**	60	A
Glacial Acetic Acid, 99%	60	A
Hydrochloric Acid, 37%	60	A
Methanol**	60	A
Methyl Ethyl Ketone**	60	A
Naphtha**	60	A
Nitric Acid, 30%	60	A

Phosphoric Acid, 75%	60	A
Potassium Hydroxide, 40%	60	A
Sodium Hydroxide, 40%	60	A
Sodium Hydroxide, 10%	60	A
Sulfuric Acid, 70%	60	A
Toluene**	60	A

* Where concentrations are indicated, percentages are by weight.

** Indicates these solvents tested with cotton and jar method

7. Performance Test Results (Heat Resistance):
 - a. Hot water (190° F - 205° F) shall be allowed to trickle on the finished surface, which shall be set at an angle of 45° from horizontal for a period of 5 minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.
8. Performance Test Results (Moisture Resistance):
 - a. A cellulose sponge 2" x 3" x 1" shall be soaked with water and placed on the finished surface for a period of 100 hours. The sponge shall be maintained in a wet condition throughout the entire test period. At the end of the test period, the surface shall be dried and no visible effect shall be shown on the finish.
9. Performance Test Results (Impact Resistance):
 - a. A 1-lb. ball (approximately 2" dia.) shall be dropped from a distance of 1-ft. onto the finished surface of a 3/4" thick plywood panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close examination.

B. Metal Finish and Performance Requirements:

1. Stainless Steel Finish: Number 4.
2. Carbon Steel:
 - a. Backed-on acid, alkali, and solvent resistant finish; highly resistant to corrosion, chemical activity, and abrasion; flexible, hard, and smooth
 - b. Finishing sequence:
 - 1) Prior to application of finish, carefully inspect each item and make ready for metal treatment and finish application
 - 2) Thoroughly clean and remove oil, grease, harmful matter, and rust spots
 - 3) Perform by cleaning solvent or by alkaline bath washing and spraying
 - 4) Hard wiping is not permitted
 - 5) Process to receive finish coats
 - 6) Pass metal parts through paint chamber where epoxy powder coating is applied
 - 7) Bake coating for appropriate time period to insure complete polymerization
3. Dry-film thickness: Minimum 1.2 mils minimum; without "orange-peel", sags, runs and over spray.
4. Cured films impact resistance:
 - a. Unaffected by 3.2 N*m (28 inch-pound impact or 1/2 inch mandrel bend when supported on 18 gage steel panel)
 - b. Pencil hardness of 8H to 9H

5. Polymerized film chemical resistance. Resist action of following reagents without effect other than loss of luster or slight discoloration when subjected to a one milliliter puddle test for one hour:

Acetic Acid: 1% to glacial
Sulfuric Acid: 25%
Sulfuric Acid: 50%
Sulfuric Acid: 85%
Hydrochloric Acid: 10%
Hydrochloric Acid: 37%
Nitric Acid: 10%
Nitric Acid: 25%
Nitric Acid: 60%
Phosphoric Acid: 85%
Perchloric Acid: 60%
Formaldehyde: 37%
Phenol: 854%
Ammonium Hydroxide Concentrate
Carbon Tetrachloride
Chloroform
Acetone
Xylol
Furfural

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with work in accordance with specifications.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Install items plumb, level, square, and free from warp and twist.
- C. Maintain dimensional tolerances and alignment with surrounding construction and adjacent surfaces.
- D. Install miscellaneous filler panels and scribes for a continuous tight-fitting assembly without gaps and spaces between cabinets, counters, service chase, and adjoining surfaces.
- E. Seal backsplashes at wall surfaces.
- F. Interface With Other Work. Install items in a sequence to not delay:
1. Adjoining construction
 2. Connections of casework and hoods to mechanical and electrical services

3.03 ADJUSTING

- A. Adjust parts for smooth, uniform operation.

3.04 CLEANING

- A. Comply with manufacturer cleaning instructions.
- B. Do not use materials and methods, which may damage finish and surrounding construction.

3.05 PROTECTION

- A. Protect finished work.
- B. Advise contractor of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by other trades.
- C. Post casework completion notices to alert other trades to the potential damage to completed work as required.

END OF SECTION 12340

SECTION 12345 - METAL LABORATORY CASEWORK AND FUME HOODS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessory, necessary to furnish, deliver and install:
- B. Open bypass design chemical fume hoods, complete with fixtures, supports, lighting fixtures, cup sinks, etc.
- C. Open bypass design, ADA compliant chemical fume hoods, complete with fixtures, supports, lighting fixtures, cup sinks, etc.
- D. Biosafety cabinets, complete with fixtures, supports, lighting fixtures, etc.
- E. Metal Casework including:
 - 1. Acid Storage Cabinets for Use Under Fume Hoods
 - 2. Solvent Storage Cabinets for Use Under Fume Hoods
 - 3. Vacuum Pump Cabinets
 - 4. Miscellaneous fillers and panels required for a finished installation
- F. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- G. For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.
- H. Products Installed But Not Specified Under This Section:
 - 1. Section 12309 - Laboratory Service Fixtures: Supply of service fixtures for fume hoods for placement under this Section
- I. Fume Hood Test Mock-Up
 - 1. General: Comply with provisions of Division 1.
 - 2. Fume Hood Test Mock-Up:
 - 3. Construct an operating prototype of the type of hood to be supplied for Project and demonstrate its ability to comply with fume hood performance requirements.
 - 4. Test Method: ANSI/ASHRAE Test 110-1995.
 - 5. Perform test under controlled conditions in manufacturer's test facility.
 - 6. Perform engineering and physical modifications on prototype to comply with performance requirements.

7. Manufacturer retains ownership of prototype.
8. Manufacturer bears costs of test mock-up and modifications to achieve performance criteria.
9. Performance requirement: Meet or exceed the recommendations of the American
10. Conference of Governmental Industrial Hygienists as defined in the most recent edition of "Industrial Ventilation. A Manual of Recommended Practice."
11. The fume hood, with vertical rising sash, shall provide adequate containment (meet ASHRAE standard) when combined with a CV system set point of 100 fpm at full open and 80 fpm when the sash is set at 18" (normal operating height).

J. Acceptance:

1. Make adjustments necessary to meet minimum performance testing criteria and obtain acceptance from Architect. Do not proceed with shop fabrication or Project installation until mock-up has been tested, and accepted by Architect.
2. Accepted mock-up establishes minimum performance standards and quality for workmanship and materials for Project.

1.02 OPERATION AND MAINTENANCE DATA

- A. Submit manufacturer's printed, operation and maintenance data.
- B. Prior to final acceptance, affix one copy of each manual described in Demonstration Article to an unobscured exterior side panel of each hood.
- C. Prior to final acceptance, submit certification that hazardous material cabinet has been electrically grounded as specified.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.

2.02 MANUFACTURERS

A. Acceptable Manufacturers:

1. Metal casework, chemical fume hoods, ADA compliant chemical fume hoods, and miscellaneous fillers and panels required for a finished installation:
 - a. Kewaunee Scientific Corporation, Statesville, NC
 - b. Jamestown Metal Products, Inc., Jamestown, NY
 - c. Mott Manufacturing Limited, Brantford, ON, Canada

2.03 COMPONENTS

A. Services for Hoods:

1. Hoods shall be pre-piped and pre-wired at the factory. Plumbing and electrical services shall be as follows:
2. Plumbing services shall consist of front loaded remote control valves as selected located within the end panels, or controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles as indicated. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color coded. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Piping shall be routed to the rear of the hood, in the side of the hood that the fittings are mounted. If fittings are mounted in both ends, there shall be two connection points. Piping shall be routed to the top of the hood, as shown on drawings. Location of plumbing services at ADA hoods shall comply with ADAAG requirements.
3. Pre-Wired hoods shall be wired using flexible metallic conduit to a single junction box located at the top of the hood for a single point connection at the job site. Electrical services shall consist of two duplex receptacles and a light switch. The duplex receptacles shall be 20 Amp, 125 volt AC, and 3-wire polarized grounded. The receptacles shall be of specification grade, ground fault interrupter type, side wired only, to insure a positive connection. The light switch shall be 20 Amp, 125 volt AC, and 3-wire polarized grounded. Location of electrical services at ADA hoods shall comply with ADAAG requirements.

2.04 OPEN BYPASS CHEMICAL FUME HOODS

A. Acceptable Products:

1. Kewaunee Scientific Corporation, Statesville, NC
2. Jamestown Metal Products, Inc., Jamestown, NY
3. Mott Manufacturing Limited, Brantford, ON, Canada

B. Description:

1. Fume hoods shall be of complete airfoil design to insure maximum operating efficiency. Foil sections at the front facias of the hood shall minimize eddying of air currents at the hood face and the rear baffle system shall minimize turbulence in the upper portion of the hood interior.
2. The hoods shall be of the Open bypass type. The fume hood design shall allow for automatic air bypass above the sash opening. The bypass shall limit the maximum air velocity through the face of the hood and provide for a constant volume of air through the hood regardless of sash position. The bypass shall control the increase in face velocity as the sash is lowered to limit the maximum velocity to not more than three and one-half, times the velocity with the sash full open.
3. Frame: A free-standing rigid frame structure of steel angle shall be provided to support exterior panels and interior liner and baffle panels. To allow for maintenance and replacements, the interior liner panels shall be removable without disassembly of the frame structure and outer steel panels. Likewise, the exterior steel panels shall be removable without disassembly of the frame structure and inner liner panels.
4. Walls: Double wall ends, not more than 4 IN wide, shall be provided to maximize interior working area. The area between the double wall ends shall be closed to house the remote control valves. The front vertical facia section shall have a full 135° 1 IN radius at the front leading edge to provide a streamlined section and insure smooth even flow of air into the hood. The vertical facias shall contain the required service controls, electrical

switches and receptacles. Side posts cannot exceed 4 IN in width. The hood interior end panels and sash track shall be flush with the fascia to prevent eddy currents and back flow of air.

5. The hood exteriors shall be fabricated of cold rolled steel, phosphate coated with a baked chemical resistant, synthetic resin finish. Rear panel if rear side of hood is exposed to view; shall be finished to match material and color of remainder of hood's outer wall shell.
6. Interior liner panels shall be 1/4 IN thick fiberglass reinforced polyester sheet. Interior liner panels shall be fastened using stainless steel screws with plastic covered heads.
7. Access panels on both inside and outside of hood wall shall be provided. The interior end liner panels shall be furnished with an opening that provides access to the service piping and valves to facilitate installation and maintenance. The openings shall be covered with a removable panel with rounded corners. Panels which require tools to remove are not acceptable. The panel shall provide an overlapping seal on all edges.
8. Airfoil: A streamlined airfoil shall be installed at the bottom of the hood opening on bench hoods. This foil shall provide a nominal 1 IN open space between the foil and the top front edge of the worksurface to direct an air stream across the work surface to prevent back flow of air. The airfoil shall extend back under the sash, so that the sash does not close the 1 IN opening. The foil shall be removable to allow large equipment to be moved into the hood. The foil shall be of 12-gauge steel to resist denting and flexing.
9. Countertop: Construct countertops of 1 IN epoxy resin, with dished design to contain spillage with a 6 IN wide safety ledge across the front edge. Where countertops are penetrated by vent piping from fume hood base cabinet, piping shall be located behind the adjustable baffle and sealed tight all around at countertop with waterproof chemical-resistant sealant. A cup drain flush with the recessed worksurface shall be provided. The worksurface and cup sink shall be black. Continuous corrosion-resistant air-tight seam between hood lining and countertop shall be provided.
10. Fume Hood Cup Sinks:
 - a. Material: Black Epoxy Resin
 - b. Size: 3 x 6 IN nominal
11. Lighting:
 - a. Two tube T8 fluorescent light fixtures to generate 1075 lx (100 foot candles) of illumination inside hood.
 - b. The light fixtures shall be isolated from the hood interior by a 1/4 IN thick tempered glass panel sealed from the hood cavity.
 - c. Fixture shall be UL labeled.
 - d. Re-lamping performed from outside of hood front and shall not require removal of hood top-to-ceiling closure panel.
12. Baffles:
 - a. A baffle with three fixed horizontal slots shall be provided to aid in distributing the flow of air into and through the hood. The baffle shall be spaced out 2-1/4 IN from the back liner. The baffle shall be removable for cleaning.
 - b. Externally adjustable baffle slots, top, and bottom shall be provided. A single point baffle adjustment shall be provided that will allow adjustment of the upper and lower slots. This single baffle adjustment shall allow the operator to make adjustments without placing their hand further than 6 IN into the hood.
13. Duct Collar:
 - a. 4 IN high and straight.
 - b. Outside Diameter: 10 to 12 IN.
 - c. Fabricated from UNS S31603 stainless steel.

- d. Provide stainless steel transition if standard exhaust collar does not meet this requirement.
- 14. Vertical Rising Sash: A vertical rising sash of 1/4 IN laminated safety float glass shall be provided. The sash shall have a neutral colored polyvinyl chloride horizontal member at the top and a full length metal handle at the bottom. The sash shall be counterbalanced with a single weight to prevent tilting and binding during operation. The sash track shall be a neutral colored polyvinyl chloride set flush with the interior liner panels to minimize turbulence. Bench hoods shall have one sash in a single slotted sash track.
- 15. Sash height limiting hardware:
 - a. Provide each fume hood with integral sash height hardware which prevents raising vertical sash above a set point.
 - b. Set points to be at full closure and 18 IN.
- 16. Overall depth of hood: 36 IN.
- 17. Fan Operation Control: Shall be provided under Division 15 Mechanical.
- 18. Safety Monitor/Alarm System:
 - a. Acceptable Products:

Safety Monitor/Alarm System	Air Alert 300 by Kewaunee
	54L0405A4 by Fisher-Hamilton
 - b. Fume hoods shall be provided with an electronic safety monitor/alarm system to detect low hood face velocities and provide audible and visual alarm if face velocity drops below safe levels. The alarm system shall sense the actual face velocity of the hood regardless of sash position. The system shall have air velocity sensing thermistor located in the monitor on the face of the hood. The monitor shall have a green light activated when the face velocity is above the set point and a red light and audible alarm which are activated when the face velocity is below the set point. The audible alarm shall be acknowledged and silenced with mute switch on panel. When the mute is activated, it shall automatically reset itself when face velocity again rises above calibrated set point. Calibration is the responsibility of the Safety Monitor/Alarm supplier and is required once the hood is stationed and the hood exhaust and room supply systems are balanced. A secondary calibration shall be factory set, at approximately 70 FMP, into the alarm's memory only to determine that the alarm is functional and ready for shipment. The primary calibration must be completed in the field.
- 19. Closure panels:
 - a. Provide fume hood closure panels from top of each fume hood to the underside of the finished ceiling.
 - b. Match closure panels to fume hood's exterior color and finish.

2.05 ADAAG COMPLIANT OPEN BYPASS CHEMICAL FUME HOODS

- A. Acceptable Products:
 - 1. Kewaunee Scientific Corporation, Statesville, NC
 - 2. Jamestown Metal Products, Inc., Jamestown, NY
 - 3. Mott Manufacturing Limited, Brantford, ON, Canada
- B. Description:
 - 1. General construction for the ADAAG compliant Chemical Fume Hoods shall be the same as for the Chemical Fume Hoods, except as follows:

2. ADAAG compliant open bypass fume hoods shall be designed to meet guidelines of the Americans with Disabilities Act (ADA).
3. It shall be complete with Sash Stop, mounted at 21" above the lower deflector to keep the sash from rising above the operators reach.
4. Fixtures and service fittings shall be moved down to within reach of wheelchair bound operator.
5. It shall be provided with radiused corner posts and airfoils for smooth air movement to assure high level of comfort, safety and efficiency.
6. Hood Support Structure and Base Cabinet for ADA Fume Hood shall be provided.
7. ADA guidelines require a space of 30" wide by 30" high by 25" deep for a wheelchair to roll beneath a fume hood.

2.06 BIOSAFETY CABINETS

A. Acceptable Products:

1. NuAire, Plymouth, Minnesota (Model # NU-425-600)
2. The Baker Company, Sanford, Maine
3. Labconco, Kansas City, MO

B. Description:

1. Six-foot, Class II Type A2, Biological Safety Cabinet, non-ducted, designed for biological work of low to moderate risk biological agents. All biologically contaminated plenums and work area side walls shall be of permanent metal construction and shall be maintained under negative pressure or enclosed within a negative pressure zone relative to outside air.
2. Cabinet shall be constructed of #18 gauge rolled-rolled steel, with #16 gauge stainless steel work surface. Radius (rounded) comers on the work surface. Side walls and rear walls to be one-piece construction. Exhaust and supply HEPA filters and motor blower system shall be removable and serviceable from the front of the cabinet without entry into workspace or removal of view screen. The cabinet shall be protected with a smooth baked enamel finish on all exterior cold rolled steel. The cabinet shall be equipped with stainless steel telescoping leg assemblies which shall allow for shipping the cabinet at a height of 74 7/8". The cabinet telescoping legs shall allow for the work surface to be 30" or 36" above the floor or be able to remove the legs to enable the unit to be used as a bench model.
3. The unit shall have a recessed work surface to retain spills, 3/16" radiused comers to provide for easy cleaning and a stainless steel ball valve to provide safe and effective drainage of the drain pan. A negative pressure shall be maintained at the upper side of the view screen relative to the external atmosphere of the cabinet.
4. The unit shall comply with CDC/NIH classification Class II Type A/B3 and NSF classification #49, 2002, Class II Type A2.
5. Unit shall be equipped with an "AirGARD" audio-visual mass airflow system to indicate when exhaust airflow drops below a set point. A warning light and buzzer on the front of the unit shall be activated when exhaust airflow drops below 5% of the set operating rate.
6. Work area shall be provided with two externally-mounted 115 volt duplex outlets with drip-proof covers and circuit breakers.

7. Lighting: Fluorescent lighting system with 200 foot-candles illumination at the work surface level.
8. Blower switch shall be provided with additional pole for interlocking unit with house exhaust system.
9. Laboratory Service Fixtures: Laboratory Service Fixtures shall be provided in the right or left work area side wall, as indicated on drawings.

2.07 METAL CASEWORK

A. Construction:

1. Unless otherwise indicated all base units under hoods shall be fabricated of cold rolled prime grade roller leveled furniture steel. Gauges of steel used in construction shall be 18 gauge except as follows:
 - a. Corner gussets for leveling bolts and apron corner braces, 12 gauge.
 - b. Hinge reinforcements, 14 gauge.
 - c. Top and intermediate front horizontal rails, apron rails and reinforcement gussets, 16 gauge.
 - d. Door assemblies and adjustable shelves, 20 gauge.
2. Performance of the painted surfaces shall match that of the fume hood outer panels.

B. Special Purpose Cabinets For Use Under Fume Hoods:

1. Acid Storage Cabinets
 - a. Where indicated, acid storage cabinets shall utilize the same gauges of steel and construction features as other base cabinets. In addition, they shall have a one piece liner insert made of linear low density polyethylene. The liner insert shall form a one-inch high pan at the bottom to retain spillage. Each door will have a set of louvers at the top and bottom. The door shall be lined with a polyethylene sheet. Each cabinet shall be vented into the fume hood with a 1-1/2 inch vent pipe. Providing a positive airflow directly into the fume hood exhaust system. See drawings for face dimensions.
2. Solvent Storage Cabinets
 - a. Solvent storage cabinets shall be specifically designed for the storage of flammable and combustible liquids. Construction shall be based upon the requirements listed by UFC, OSHA, and NFPA No. 30 - 1993. The bottoms, top, sides and doors shall be fabricated of 18" gauge steel and shall be all double panel construction with a 1 1/2 inch air space between panels. All joints shall be welded, or screwed, to provide a rigid enclosure. The doors shall swing on full length stainless steel piano hinges and shall be fully insulated. The right hand door shall be equipped with a three point latching device and the left hand door shall have a full height astragal. The doors shall be self-closing and synchronized so that both doors will always fully close. The right hand door shall be equipped with a three-point latching system that automatically engages when the doors close. Each door shall be equipped with a fusible-link hold-open feature that will ensure the door closes should the temperature outside the cabinet exceed 165 degrees Fahrenheit. Units 24 inches long shall have only one door, self-closing, and equipped with a three-point latching system and hold-open feature. A 2 inches deep liquid tight pan that covers the entire bottom of the cabinet shall be furnished to contain liquid leaks and spills. A full-depth adjustable shelf shall also be provided. The shelf shall be perforated to allow air circulation within the cabinet. Two diametrically opposed vents with spark

screens shall be provided in the back of the cabinet as well as a grounding screw. The cabinet shall have interior finish same as exterior. The cabinet shall be labeled: "FLAMMABLE - KEEP FIRE AWAY". See drawings for face dimensions.

C. Vacuum Pump Cabinets

1. Vacuum Pump Storage Cabinets shall be designed without a bottom to allow vacuum pumps, shelving units and other equipment to be rolled in or out of the cabinets.
2. The toe space rail shall be attached to the door to allow total access to the cabinet.
3. The interior shall be lined with 1" thick neoprene foam for sound deadening and easy cleaning.
4. Each cabinet shall be furnished with a 120 VAC, 20 amp, duplex receptacle mounted in the top front rail.
5. Provide a pilot lighted toggle switch mounted in the top front rail.
6. Cabinets shall also be furnished with a 2" diameter vent pipe for venting connections, or access to the hood above.

D. Accessories

1. Fasteners and Anchors: Size and type to securely fasten and anchor items to substrates and supporting structure.
2. Provide miscellaneous fillers and panels required for a finished installation.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements, applicable to this and all other Casework Specification Sections including, but not limited to, examination, installation, adjusting, cleaning, and protection general requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.

3.02 ADDITIONAL INSTALLATION REQUIREMENTS

- A. Fasten together assemblies to meet Performance Requirements specified above.
- B. Floor Mounted Cabinets:
1. Locate at designated positions.
 2. Level by means of adjustment device located in cabinet's bottom corners.
 3. Continuously seal space between base cabinet and floor with sanitary silicone specified in Division 7.
- C. Countertops: Anchor to base cabinets.
- D. Field Joints:
1. Reinforce and weld in manner equivalent to shop welds and joints.

E. Wall Joints:

1. Joints between equipment and walls up to 3/8 inches wide:
 - a. Fill with sealant backing bond breaker rod and silicone sealant.
 - b. Comply with requirements of Division 7.
 - c. Apply sealant in one continuous pass, compressing surface slightly concave and forcing contact with both sides of joints.
2. Joints between casework and walls larger than 3/8 inches wide:
 - a. Seal with stainless steel closure or filler strip.
 - b. Fit tightly and fasten securely with concealed clips.

F. Site Tolerances: Install wall-to-wall countertops with a maximum 1/4 inch gap.

END OF SECTION 12345

SECTION 12346 - WOOD LABORATORY CASEWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes, but is not limited to, all materials, labor and equipment, complete with all anchors and related accessories, necessary to furnish, deliver and install:
 - 1. Open-leg Tables
 - 2. Wood Aprons
 - 3. Floor Mounted Base Cabinets (Swinging doors, drawers and open shelves)
 - 4. Wall Mounted Cabinets
 - 5. Swinging Solid and Glass Door Full Height Cabinets
 - 6. Microscope Cabinets
 - 7. Wall Mounted Shelves
 - 8. Miscellaneous fillers and panels required for a finished installation
- B. Although such work is not specifically shown or specified, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
- C. For general requirements applicable to this and all other Casework Specification Sections including, but not limited to definitions, system description, submittals, quality assurance, mock-up, testing, field measurements, pre-installation conference, delivery, storage and handling, project conditions, and sequencing requirements, refer to Specification Section 12340 for Laboratory Casework - General Requirements.
- D. Products Installed But Not Specified Under This Section:
 - 1. Section 12309 - Laboratory Service Fixtures: Supply of service fixtures for placement under this Section.

PART 2 - PRODUCTS

2.01 GENERAL

- A. For general requirements, applicable to this and all other Casework Specification Sections including, but not limited to, manufacturers, materials, components, and finish and performance requirements, refer to Specification Section 12340 - Laboratory Casework - General Requirements.

2.02 MANUFACTURERS

- A. Casework Acceptable Manufacturers:
 - 1. Kewaunee Scientific Corporation, Statesville, NC

2. Advanced Lab Concepts (ALC), Austin, TX
3. Valley City Manufacturing, Dundas, ON, Canada

2.03 FABRICATION

- A. Prior to fabrication, field measure actual existing conditions to ensure proper fit.
- B. Casework shall be maple, square edge flush overlay style construction with 1/8" reveals between door to door, door to drawer, drawer to drawer; 1/16" vertical reveal between doors/drawers and cabinet ends.
- C. Cabinets shall be rigid, self-supporting design for use in assembly or as a single stand alone unit if furnished with exposed finished ends.
- D. Flush Interiors: Surface mounted bottoms and offsets caused by front face frames, which interfere with ease of cleaning, are not acceptable.
- E. Joinery: 1 1/4" doweled joinery system glued, clamped and screwed. Dowels to be hardwood laterally fluted with chamfered ends and a minimum diameter of 0.31". Spacing of dowels to meet AWI (Architectural Woodworking Institute) and WI (Woodwork Institute) standards. Exposed shoulder pocket screw fasteners are not acceptable.
- F. Casework width and depth dimension are to be within plus or minus 1/2" from what is shown on the drawings. Manufacturer's standards are not acceptable unless able to meet these requirements.
- G. Cabinet ends: 3/4" thick plywood (for both exposed and concealed ends) with 3mm hardwood banding on front edges. Bore interior faces, as appropriate, for security panels, rails, and four rows of shelf support holes.
- H. No levelers required. Wood shimming approved.

2.04 OPEN-LEG TABLES

- A. Perimeter table frame rails: 3/4" x 4-5/16" hardwood with attached steel corner braces, grooved and screwed into both rails at each corner. (Bottom rail edges to be radiused.)
- B. Reinforcing cross rails: 3/4" veneer core plywood, doweled and glued and pinned into front and back rails, at intervals not more than 33" on center in tables without drawers.
- C. Separate cross rails: 3/4" x 4-5/16" hardwood with attached steel brackets at both ends.
- D. Legs: 2" x 2" hardwood, with 3/8"-16 x 3-1/2" hanger bolt inserted 1-3/4" into leg and fastened to perimeter rail corner brace.
- E. Leg rails (if required): 1-1/4" x 2-1/2" hardwood mortised into legs and secured with 3/8"-16 x 5" stove bolt.
- F. Leg shoes: Black rubber or vinyl with provision for floor clip.
- G. Tables with electrical outlets at the apron shall be provided with cleats so that the 6' cords can be wrapped up when not in use.

- H. Adjustable tables shall have maple apron with steel corner brace. Adjustable legs shall adjust the height from 27" H to 39" H in one inch increments. Powder coated steel legs shall be adjustable without the use of tools. Legs shall rise on a ratchet system and lower slowly on hydraulics. There shall be no pinch points between the leg and the top. Legs shall include a black spacer and leveling glide which can be removed by simply screwing off. Top shall be 1" phenolic resin to match color of countertops.

2.05 WOOD APRONS

- A. All apron rails shall be 3/4" thick 5-ply maple veneer lumber core plywood.

2.06 FLOOR MOUNTED BASE CABINETS (SWINGING DOOR, DRAWER, AND OPEN SHELF)

- A. All cabinet end panels shall be 3/4" thick 7-ply hardwood plywood and 3/4" x 1/8" thick maple facing. End panels shall be multiple doweled, glued and/or screwed to top frame members, intermediate rails and bottoms. Cabinet backs shall be 1/4" thick tempered hardboard dadoed into end panels and bottoms and securely fastened. Cupboard bottoms shall be 3/4" thick, 7-ply hardwood plywood with 3/4" x 1/8" maple facing on front edge. All cupboard base units shall have full-width adjustable shelves, 3/4" thick, 7-ply plywood with maple facing on exposed edges. Integrally joined parts shall result in a totally enclosed cabinet.
- B. General construction for open shelf base cabinet features shall be the same as for swinging door base cabinets except without doors.
- C. Drawers: Drawer sides shall be 7/16" thick, 7-ply solid maple plywood. Drawer heads shall be 3/4" thick, 5-ply solid core plywood. A glue and dove-tailed joint shall be used to attach the drawer head to the sides on all drawers over 3" in depth. A mortise and tenon joint shall be used for shallow drawers. Drawer bottoms shall be 1/4" thick tempered hardboard, set and glued into 1/4" grooves, four sides, with the same clear chemical resistance finish as the exposed wood.
- D. Drawer Suspension: All drawer suspension assemblies shall be rated at 150 pounds. Case channels shall maintain alignment of drawer. The drawer shall be removable without the use of tools. Drawers shall be self-closing. Slides shall wrap under drawer sides for additional support. Drawer stops shall be provided.

2.07 WALL MOUNTED CABINETS

- A. Cabinets shall be designed and integrally constructed for full enclosure to assure dust proofing of the cabinet interior. All exposed woods shall be maple. All end panels shall be 3/4" thick maple with a 3/4" x 1/8" maple hardwood facing. Tops for open or glazed doors shall be 3/4" thick maple plywood, multiple doweled into end panels secured with glue and countersunk screws. Glass framed doors shall be 3/4" thick with 3-3/16" wide solid maple framing under 48" in height, and 1" thick by 3-3/16" solid maple framing for 48" high cabinets. Glass shall be set into door frame and secured with a plastic retainer. Shelves, exposed to view, shall be full-width, 3/4" thick plywood with a maple banding.
- B. Doors:
 - 1. Sliding Plate Glass Doors:
 - a. Solid glass doors shall be 1/4" thick float glass with polished edges. Doors shall be set in an aluminum bottom frame containing roller bearings and held in position with an aluminum guide at the top of the case.

2. Swinging Doors:
 - a. Cabinets shall be designed and integrally constructed for full enclosure to assure dust proofing of the cabinet interior.
 - b. Doors shall either be solid hardwood core panel or glass framed, as indicated. Solid hardwood core doors shall be 3/4" thick maple plywood with 1/8" maple edging. Glass doors shall be 1/4" thick float glass with polished edges.
 - c. Doors shall be hung on 1 pair of offset hinges and shall latch with a roller catch. Double doors without locks shall have a roller catch on each door. Double doors with locks shall have an elbow catch and White Maple astragal mounted to the left-hand door and the lock and a roller catch mounted on the right-hand door. Glass shall be set into door solid maple frame and secured with a plastic retainer.

2.08 SWINGING SOLID AND GLASS DOOR FULL HEIGHT CABINETS

1. Cabinets shall be designed and integrally constructed for full enclosure to assure dust proofing of the case interior. All exposed woods shall be maple. All end panels shall be 3/4" thick maple with a 3/4" x 1/8" maple hardwood facing. Tops for open or glazed doors shall be 3/4" thick maple plywood, multiple doweled into end panels secured with glue and countersunk screws. The top in solid door cases shall be 3/4" thick plywood. Panel doors shall be 1" thick, solid hardwood core plywood. Glass framed doors shall be 3/4" thick with 3-3/16" wide solid maple framing under 48" in height, and 1" thick by 3-3/16" solid maple framing for 48" high cabinets, mortised, tenoned, and glued. Glass shall be set into door frame and secured with a plastic retainer. Doors shall be removable without use of tools, and so designed to prevent by-passing. Doors shall either be solid hardwood core panel, glass framed or with marker board as indicated, hung on 1-1/2 pair of 2-1/2" long offset type institutional hinges. Swinging doors shall overlap opening four sides; astragal applied to left hand door shall provide further dust proofing. Marker board doors shall be 3/4 inch white maple composite core plywood with 1/8 inch white maple edging. A dry-erase magnetic white board shall be applied to the wood door. Shelves, exposed to view, shall be 3/4" thick maple plywood with a maple banding on exposed edge; unexposed shelves shall be 3/4" thick plywood with and maple banding. To assure a completely rigid case, the center shelf shall be structurally joined to the end panels and glued. All other shelves (4) shall be adjustable on 1 1/4" centers. Cabinet bottoms shall be 3/4" thick maple plywood, exposed to view, or 3/4" thick plywood, unexposed, multiple doweled and glued securely to end panels. Glue blocks, 3" long, shall further support and strengthen all joints. All cabinets 22" in depth shall have 3/4" thick maple plywood bottom with a 3/4" x 1/8" thick maple hardwood facing, and a 3/4" x 4" hardwood plywood toe space rail to form a 2-1/2" deep x 4" high totally enclosed toe space. Twelve inch and sixteen inch deep cabinets shall use a 1" x 4-3/4" solid maple base rail mounted flush with the face of the case. The backs in open and glazed door cabinets shall be 1/4" maple plywood while the back not exposed to view shall be 1/4" tempered hardboard. Cabinet interior shall be flush. A 2-1/2" x 4" high totally enclosed toe space shall be same as for base units. Doors shall either be solid hardwood core panel or glass framed, as indicated.
2. Marker Board Sliding Doors shall consist of porcelain-on-steel markerboard. Writing surface shall be 24 gauge steel face with porcelain enamel finish fused to the steel sheet using a continuous oil process
 - a. Markerboard surface shall be fused at a temperature of 1450° and 1200° respectively.
 - b. The gloss of the writing surface shall not increase more than three units when subjected to wearability tests specified in testing procedures for 30 hours.
 - c. Core Material: 1/2 inch honeycomb.
 - d. Backing Material: .15 inch aluminum foil.

- e. Metal Trim and Accessories: 6063 aluminum alloy with a T5 temper.
- f. Adhesive: As recommended by manufacturer for project conditions.
- g. Assemble units in one piece without joints, wherever possible. Where required dimensions exceed maximum panel size available, provide two or more pieces of equal length, as indicated on approved shop drawings.

2.09 Microscope Cabinets

- 1. General construction for the Microscope Cabinets shall be the same as for the Swinging Solid and Glass Door Full Height Cabinets, except as follows:
 - a. Provide 20 or 30 microscope storage compartments, as shown on drawings.
 - b. Cabinet shall have glass doors and be lockable.
 - c. All Microscope Cabinet shelves and vertical partitions shall be adjustable and removable.

2.10 Wall Mounted Shelving System:

- 1. Wall Mounted Shelving Systems shall consist of Wood Shelves, with Heavy Duty Vertical Wall Standards, and Heavy Duty Adjustable Shelf Brackets. Fasten standards to concrete masonry walls or properly blocked steel studded walls with appropriate flat head screws.
- 2. Vertical Wall Standards shall allow adjustable bracket to be positioned along its full length for maximum use of space. A pair of vertical supports shall hold the shelves and their support brackets.
- 3. Adjustable shelf bracket shall have up-turned lip to prevent shelves from being pulled off bracket. It shall be formed from high-strength, cold-rolled steel. It shall include mounting hardware to secure bracket to vertical wall standards.

2.11 FASTENERS AND ANCHORS

- A. Size and type to securely fasten and anchor items to substrates and supporting structure.
- B. Provide miscellaneous fillers and panels required for a finished installation.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

- A. For General Installation Requirements, applicable to this and all other Casework Specification Sections including, but not limited to, examination, installation, adjusting, cleaning, and protection requirements, refer to Specification Section 12340 for Laboratory Casework - General Requirements.

3.02 ADDITIONAL INSTALLATION REQUIREMENTS

- A. Floor Mounted Base Cabinets:
 - 1. Locate at designated positions
 - 2. Level by means of adjustment device located in cabinet's bottom corners
 - 3. Continuously seal space between base cabinet and floor with sanitary silicone specified in Division 7.

- B. Countertops: Anchor to base cabinets, unless noted otherwise.
- C. Fasten together assemblies listed below with devices of adequate strength to support cabinet and shelves loaded 40 pound per square foot per shelf for enclosed wall cabinets or open adjustable shelves not inclusive of cabinet, shelf, and bracket weight.
 - 1. Wall cabinet to wall
 - 2. Wall mounted shelves to wall
- D. Site Tolerances: Install wall-to-wall countertops with a maximum 1/4 inch gap.

END OF SECTION 12346

**SECTION 13040
ABOVE GROUND STORAGE TANKS**

PART 1 - GENERAL

1.1 Scope of Work

- A. Furnish and erect a Factory Mutual Approved glass-fused-to-steel bolted water storage tank for fire suppression use, including foundation, tank structure and tank appurtenances as shown on the drawings. All required labor, materials and equipment shall be included.
- B. Tank and all appurtenances shall be in accordance with NFPA 13-2007 and NFPA 22-2003 regulations.

1.2 Submittal Drawings and Specifications

- A. The bidder is required to furnish, for the approval of the Engineer and at no increase in contract price, 6 sets of complete specifications and construction drawings for all work. A complete set of structural calculations shall be provided for the tank structure and foundation. All such submissions shall be stamped by a Registered Professional Engineer licensed in the state of Virginia.
- B. When approved, two sets of such prints and submittal information will be returned to the contractor and these drawings will then govern for the work detailed thereon. The approval by the Engineer of the tank supplier's drawings shall be an approval relating only to their general conformity with the bidding drawings and specifications and shall not guarantee detail dimensions and quantities, which remains the bidder's responsibility.
- C. After the design is reviewed by the Engineer, project inspection shall comply with BCOM DEB Notice 012010 - Delegation of Authority for Storage Tank Systems.
- D. The tank manufacturer's and installing contractor's standard published warranty shall be included with submittal information.
- E. The tank manufacturer shall provide the Operation and Maintenance Manual upon receipt of approved drawings.

PART 2 - PRODUCTS

2.1 Design Criteria

- A. Tank dimensions, capacity and floor elevation shall be as shown on the drawings.
- B. Tank Design Standards
 - 1. The materials, design, fabrication and erection of the bolted steel tank shall conform to the AWWA Standard for "Factory-Coated Bolted Steel Tanks For Water Storage" - ANSI/AWWA D103, NPFA 22-2003 and Factory Mutual (FM) specifications for bolted steel pump suction tanks.
 - 2. Design loads shall comply with NFPA 22-2003.
 - 3. The tank coating system shall conform solely to Section 10.4 of ANSI/AWWA D103 latest revision.
 - 4. All materials furnished by the tank manufacturer, which are in contact with the stored water shall be certified and listed by the National Sanitation Foundation (NSF) to meet ANSI/NSF Additives Standard No. 61. Certification of a coating type alone will not be sufficient to meet this requirement.

C. Design Loads

1. The tank manufacturer is responsible for the design of the tank and therefore is responsible for selecting the appropriate design loads for the tank. This shall include but not be limited to wind velocity, design freeboard, roof snow load, seismic classification and soil bearing. The contractor will be responsible for obtaining the necessary geotechnical information required for the tank design.

D. Tank Color

1. The tank shall be Forest Green in color.

2.2 MATERIALS SPECIFICATIONS

A. Plates and Sheets

1. Plates and sheets used in the construction of the tank shell and tank roof, shall comply with the minimum standards of AWWA D103.
2. Design requirements for mild strength steel shall be ASTM A1011 Grade 30 with a maximum allowable tensile stress of 14,566 psi per AWWA D103.
3. Design requirements for high strength steel shall be ASTM A1011 Grade 50 with a maximum allowable tensile stress of 26,000 psi.
4. The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103, Sections 3.4 and 3.5.
5. When multiple vertical bolt line sheets and plates of ASTM A1011 Grade 50 are used, the effective net section area shall not be taken as greater than 85% of the gross area.

B. Rolled Structural Shapes

1. Material shall conform to minimum standards of ASTM A36 or ASTM A992.

C. Horizontal Wind Stiffeners

1. Design requirements for intermediate horizontal wind stiffeners shall be of the "web truss" type with an extended tail creating multiple layers of stiffener, permitting wind loads to be distributed around the tank.
2. Web truss stiffeners shall be of steel with hot dipped galvanized coating.
3. Rolled steel angle stiffeners are not permitted for use as horizontal wind stiffeners.

D. Bolt Fasteners

1. Bolts used in tank lap joints shall be 1/2" - 13 UNC- 2A rolled thread, and shall meet the minimum requirements of AWWA D103, Section 2.2.
2. Bolt Material
 - a) SAE Grade 2 (1" bolt length)
 - i. Tensile Strength - 74,000 psi Min.
 - ii. Proof Load - 55,000 psi Min.
 - iii. Allowable shear stress with threads excluded from the shear plane - 18,163 psi (AWWA D-103).
 - b) SAE Grade 5/ASTM A325 (1 1/4" bolt length)

- i. Tensile Strength - 120,000 psi Min.
 - ii. Proof Load - 85,000 psi Min.
 - iii. Allowable shear stress with threads excluded from the shear plane – 29,454 psi (AWWA D-103).
- c) SAE grade 8/ASTM A490 (>1 1/4" bolt length)
 - i. Tensile Strength - 150,000 psi Min.
 - ii. Proof Load - 120,000 psi Min.
 - iii. Allowable shear stress with threads excluded from the shear plane - 36,818 psi (AWWA D-103).
- 3. Bolt Finish - Zinc, mechanically deposited.
 - a) 2.0 mils minimum - under bolt head, on shank and threads
- 4. Bolt Head Encapsulation
 - a) High impact polypropylene copolymer encapsulation of entire bolt head up to the splines on the shank.
 - b) Resin shall be stabilized with an ultraviolet light resistant material such that the color shall appear black.
 - c) The bolt head encapsulation shall be certified to meet the ANSI/NSF Standard 61 for indirect additives.
- 5. All tank shell bolts shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.
- 6. All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the "shear plane" between tank sheets. Bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted.
- 7. All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.

E. Sealants

- 1. The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall be suitable for contact with potable water and meet applicable FDA Title 21 regulations, as well as, ANSI/NSF Additives Standard 61.
- 2. The sealant shall be used to seal lap joints and bolt connections and edge fillets for sheet notches and starter sheets. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the glass coating, low shrinkage, and be suitable for interior and exterior use.
- 3. Sealant curing rate at 73° F and 50% RH
 - a) Tack-free time: 6 to 8 hours.
 - b) Final cure time: 10 to 12 days.
- 4. Neoprene gaskets and tape type sealer shall not be used.

2.3 GLASS COATING SPECIFICATION

A. Surface Preparation

1. Following the decoiling and shearing process, sheets shall be steel grit-blasted on both sides to the equivalent of SSPC-10. Sand blasting and chemical pickling of steel sheets is not acceptable.
2. The surface anchor pattern shall be not less than 1.0 mil.
3. These sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

B. Preparation of Sheet Edges

1. After initial sheet preparation, all full height vertical wall sheets and all rectangular shaped floor sheets shall be beveled and an ARC deposited coating of a corrosion resistant stainless steel alloy shall be applied to the exposed sheet edges.

C. Cleaning

1. After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.
2. Inspection of the sheets shall be made for traces of foreign matter or rust. Any such sheets shall be recleaned or grit-blasted to an acceptable level of quality.

D. Coating

1. All side wall sheets shall receive one coat of a glass pre-coat to both sides and then air dried.
2. Another coat of milled cobalt blue glass shall be applied to both sides of the sheets.
3. A third coat of titanium dioxide reinforced white glass shall be applied to all interior sheet surfaces. The specified coating shall be Aquastore Vitrium™.
4. The same glass coating as applied to the exterior sheet surfaces shall be applied to the exposed edges.
5. The sheets shall then be fired at a minimum temperature of 1500° F in strict accordance with the manufacturer's ISO 9001 quality control procedures, including firing time, furnace humidity, temperature control, etc.
6. The minimum glass thickness on the interior of the sheet after firing shall be 10 mils.

E. Inspection

1. The manufacturer's quality system shall be ISO 9001 certified.
2. Coated sheets shall be inspected for mil thickness (Mikrotest or equal).
3. Coated sheets shall be checked for color uniformity by an electronic colorimeter.
4. An electrical leak detection test shall be performed on the inside surface after fabrication of the sheet. Sheets with excessive electrical leakers shall be rejected.

F. Packaging

1. All sheets that pass Factory Inspection and Quality Control checks shall be protected from damage prior to packing for shipment.
2. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.

3. Individual stacks of panels will be wrapped in heavy mil plastic and steel banded to special wood pallets built to maintain the roll-radius of the tank panels and minimize contact or movement of finished panels during shipment.
4. Shipment from the factory will be by truck, hauling the tank components exclusively.

PART 3 - EXECUTION

3.1 Erection

A. Foundation

1. The tank foundation is a part of this contract and shall be installed by the tank bidder.
2. The tank foundation shall be designed by the manufacturer to safely sustain the structure and its live loads.
3. Tank footing design shall be based on the soil bearing capacity as determined by geotechnical analysis performed by a licensed soils engineer.

B. Tank Floor

1. The floor design is of reinforced concrete with an embedded glass coated steel starter sheet per the manufacturer's design and in accordance with AWWA D103 latest edition, Sec 11.4.
2. Leveling of the starter ring shall be required and the maximum differential elevation within the ring shall not exceed one-eighth (1/8) inch, nor exceed one-sixteenth (1/16) inch within any ten (10) feet of length.
3. A leveling plate assembly consisting of two anchor rods and a slotted plate shall be used to secure the starter ring, prior to encasement in concrete. Installation of the starter ring on concrete blocks or bricks, using shims for adjustment, is not permitted.
4. Place one butyl rubber elastomer waterstop seal on the inside surface of the starter ring below concrete floor line. Place one bentonite impregnated water seal below the butyl rubber seal. The materials shall be installed in accordance with tank manufacturer's instructions.

C. Sidewall Structure

1. Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks, using factory trained and certified erectors.
2. Specialized erection jacks and building equipment developed and manufactured by the tank manufacturer shall be used to erect the tanks.
3. Particular care shall be taken in handling and bolting of the tank panels, structural members, and appurtenances to avoid abrasion of the coating system. Prior to a liquid test, all surface areas shall be visually inspected by the Engineer.
4. An electrical leak test shall be performed during erection using a wet sponge nine (9) volt leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturer's published touch up procedure.
5. No backfill shall be placed against the tank sidewall without prior written approval of the tank manufacturer. Any backfill allowed shall be placed according to the strict instructions of the tank manufacturer.

D. Roof

1. Tanks shall include a radially sectioned roof fabricated from glass-coated, bolted steel panels, as produced by the tank manufacturer, and shall be assembled in a similar manner as the sidewall panels utilizing the same sealant and bolting techniques, to assure a weather tight assembly. The roof shall be clear-span and self-supporting. Both live and dead loads shall be carried by the tank walls. The roof shall be of a rolled knuckle design, with no rolled angle connection between sidewall and roof panels. The manufacturer shall furnish a roof opening which shall be placed near the outside tank ladder and which shall be provided with a hinged cover and a hasp for locking. The opening shall have a clear dimension of at least twenty-four (24") inches in one direction and fifteen (15") inches in the other direction. The opening shall have a curb at least four (4") inches in height, and the cover shall have a downward overlap of at least two (2") inches, or a gasketed weather-tight cover in lieu of the four (4") inch curb and two (2") inch overlap.
2. Roof Vent
 - a) A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum design rate of water fill or withdrawal, the resulting interior pressure or vacuum will not exceed 0.5" water column.
 - b) The overflow pipe shall not be considered to be a tank vent.
 - c) The vent shall be constructed of aluminum such that the hood can be unbolted and used as a secondary roof access.
 - d) The vent shall be so designed in construction as to prevent the entrance of birds and/or animals by including an expanded aluminum screen (½ inch) opening. An insect screen of 23 to 25 mesh polyester monofilament shall be provided and designed to open should the screen become plugged by ice formation.

E. Appurtenances (per AWWA D103, Section 5)

1. Pipe Connections
 - a) Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. The tank shell reinforcing shall comply with AWWA D103 latest edition. A single component urethane sealer shall be applied on any cut panel edges or bolt connections.
 - b) Overflow piping shall be exterior schedule 80 PVC size as indicated on the drawings.
2. Outside Tank Ladder
 - a) An outside tank ladder shall be furnished and installed as shown on the submittal drawings.
 - b) Ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs.
 - c) Safety cage and step-off platforms shall be fabricated of galvanized steel. Ladders shall be equipped with a hinged lockable entry device.
3. Sidewall Access Manways
 - a) Two bottom access doors shall be provided in accordance with NFPA 22.

- b) The manhole opening shall be a minimum of 24 inches in diameter. The access door (shell manhole) and the tank shell reinforcing shall comply with AWWA D103 latest edition, Sec. 5.1.

4. Identification Plate

- a) A manufacturer's nameplate shall list the tank serial number, tank diameter and height, and maximum design capacity. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five (5) feet from grade elevation in a position of unobstructed view.

5. Cathodic Protection

- a) A passive cathodic protection system shall be designed and supplied by the tank manufacturer.

6. Temperature Monitoring

- a) Two critical water temperature sensors shall be provided to monitor the temperature in the tank in accordance with NFPA 22 and 72. The signals for these sensors shall be connected to the fire pump control panel located in the main building.

7. Level Monitoring

- a) Two critical water level floats shall be provided to monitor the water level in the tank in accordance with NFPA 22 and 72. The signals for these floats shall be connected to the fire pump control panel located in the main building. The floats shall be provided with enough cable to allow them to be adjusted to any level in the tank.

8. Hillside Nozzles

- a) Hillside nozzles shall be used for all small tank penetrations for controls connections.

3.2 Field Testing

A. Hydrostatic

1. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation.
2. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations.
3. Water required for testing shall be furnished by the Owner at the time of tank erection completion, and at no charge to the tank erector.
4. Labor and equipment necessary for hydrostatic tank testing is to be included in the price of the tank.

3.3 Disinfection

A. Standards

1. The tank structure shall be disinfected at the time of testing by chlorination in accordance with AWWA Standard C652-02 "Disinfection of Water Storage Facilities" as modified by the tank manufacturer.
2. Disinfection shall not take place until tank sealant is fully cured.
3. Acceptable forms of chlorine for disinfection shall be:

- a) Liquid chlorine as specified in AWWA C652-02.
- b) Sodium hypochlorite as specified in AWWA C652-02.
- 4. Acceptable methods of chlorination shall be:
 - a) Chlorination method 1 as outlined in AWWA C652-02 Section 4.3.
 - b) Chlorination method 2 as outlined in AWWA C652-02 Section 4.3.
 - c) Chlorination method 3 as outlined in AWWA C652-02 Section 4.3.
- 5. Acceptable application methods shall be:
 - a) Chemical feed pump.
 - b) Spraying, brushing, or painting of all water-contact surfaces.

3.4 Tank Manufacturer's Warranty

- A. The tank manufacturer shall include a warranty for the tank materials and coating. As a minimum, this warranty shall provide assurance against defects in material or workmanship and corrosion of the glass coated surface for a period of one (1) year.

END OF SECTION 13040

SECTION 13341

GLAZED CANOPY STRUCTURE

PART 1 GENERAL

1.01 SCOPE

- A. Comply with all requirements of Division 1.
- B. Work under this section is the responsibility of the Specialty Structural Glass Contractor and consists of furnishing everything necessary for and incidental to the execution and completion of the point supported structural glass system, spaceframe roof structure and accessory work. The complete System shall be purchased from the Structural Glass Contractor as a single source.
- C. The General Contractor as used herein refers to the entity contracting for the structural glazing.
- D. Related Sections:
 - 1. Section 07900 - Joint Sealers
 - 2. Section 08800 - Glazing

1.02 DESCRIPTION OF WORK

- A. The extent of the point supported structural glazing, spaceframe roof structure and associated work as defined above is shown on the architectural and structural drawings.
- B. The work includes the following:
 - 1. Engineering design of the structural glazing, spaceframe roof structure and accessory parts by the Structural Glass Contractor, including structural calculation submittals.
 - 2. Fabrication, packaging and delivery to job site.
 - 3. Installation by an installer approved by the Structural Glass Contractor or under the direction of a technical advisor of that Contractor.

1.03 QUALITY ASSURANCE

- A. Structural Glass Contractor's Qualifications:
 - 1. The Structural Glass Contractor shall provide in-house services which include full design, engineering and installation service for the structural glazing as a single entity. Subcontracting with outside sources for any of these services is not acceptable. The assembly of joint ventures to provide these services is also not acceptable.
 - 2. Project shall be tendered by, contracted for and managed directly by the Structural Glass Contractor. Tenders or project management by a sales agent, intermediary, glazing contractor, agent or distributor of the listed Structural Glass Contractor will not be acceptable. The General Contractor must contract this work from the preapproved Structural Glass Contractors as listed under this section directly and not through an intermediary. No exceptions.
 - 3. All bidding Structural Glass Contractors must submit a current IAS certification for the spaceframe system that they intend to utilize PRIOR to bid.

- B. Safety Glass: Where safety glass is indicated or required by authorities having jurisdiction, provide the types of products that comply with ANSI Z97.1 and CPSC 16 CFR 1201 Category II.

1.04 SUBMITTALS

- A. Structural Calculations: Prior to fabrication of the structural glazing, submit design calculations prepared in accordance with current design rules for structural glazing and applicable codes as called for by the Project Engineer. The calculations shall be prepared, signed, and sealed by an engineer licensed in the state of Virginia. Include analysis and design for all combinations of load cases such as live, dead, wind, thermal, snow, seismic, etc...
1. Supply structural reactions in each axis, at each typical support, for review and acceptance by the Project Engineer, and the maximum glass deflections in all axis.
 2. Supply calculations for support and other details as necessary.
 3. Panel thickness shall be sized by the Structural Glass Contractor.
 4. Existing text reports are only acceptable as proof of capacity calculations, but will not be acceptable in lieu of calculations.
- B. Shop Drawings: Submit complete shop drawings including glass panel layouts and details. The shop drawings shall be prepared, signed, and sealed by an engineer licensed in the state of Virginia. Show dimensioned layout of structural glazing in relation to adjacent work such as walls, columns, beams, slabs, etc...
1. Include details of all supports and data to show provisions for vertical and horizontal expansion/contraction and building movements as necessary.
 2. Identify all materials, attachments devices and accessories including necessary tolerances.
- C. Installation Drawings: After approval of shop drawings, provide a detailed set of field installation drawings and a written installation procedure. Identify each part by size and number.
- D. Product Data: Material description for tapes, compounds, gaskets and other material.
- E. Samples: Submit samples of glass and glazing materials required for the project. Samples of glass shall be 12" x 12". Samples of sealants or gaskets shall be 12" long. Submit samples of fixing hardware assemblies, bolts and accessories.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All glass shall be manufactured, crated, stored, handled and shipped in a manner that will provide unscratched and undamaged units delivered to the site. Fittings which engage with the glass shall be individually boxed in a way to protect edges from damage and/or scratching.
- B. Time the delivery of materials to the site to ensure uninterrupted progress of the installation work.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Where the system is indicated to fit against walls and other construction, the Structural Glass Contractor shall verify dimensions by field measurements before installation and notify General Contractor of any deviations from approved shop drawings. General Contractor shall correct conditions to comply with the

- system tolerances specified for the project and as indicated in the approval drawings, which may be tighter than industry standard.
- B. Structural glass shall be fabricated in accordance with approved shop drawings which shall include dimensional approval from the Architect and General Contractor.
 - C. Coordinate fabrication schedule with construction progress to avoid delaying the work.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

- A. Design the structural glazing system and applicable other components for the locations and conditions shown in the architectural and structural drawings and to the loading requirements and codes specified in the bid documents. In addition, if not specifically called for in the documents, consider the following:
 - 1. Temperature variation: 5 to 100 degrees (i.e., +/-5 degrees from a medium temperature of 53 degrees Fahrenheit).
 - 2. Loads created by installation techniques and lifting devices.
- B. The Project Engineer shall provide in the bid documents the following criteria that shall be accommodated in the system's design:
 - 1. Deflections of edge beams due to loading applied after the installation of the cladding.
 - 2. Side sway movements of the adjacent structure due to wind and seismic load.
 - 3. Anticipated deflections due to self-weight of the structural glass system.

2.2 FABRICATION

- A. Provide all glass and structural hardware, connectors, fasteners and accessories required for a complete installation of the structural glazing as indicated in approved shop drawings.
- B. Code each part for easy identification. Cross reference this coding to shop/installation drawings and to shipping lists.

2.3 STRUCTURAL GLASS CONTRACTOR

- A. Contractor/Manufacturer: The construction documents are based on the PSG-System, and KK-System as manufactured and engineered by Novum Structures of Menomonee Falls, WI (Phone: 262-255-5561). As such, Novum Structures is a pre-approved Structural Glass Contractor for the scope described under this section.
 - 1. Others acceptable as long as in strict conformance with the complete set of construction documents include:
 - a. Unisky Corporation
 - b. Binzwanger Glass
- B. System Description: The system is comprised of structural glass panels held by rotules through factory drilled holes such that the glass can be mechanically fastened to the support structure. Joints are comprised of uninterrupted wet silicone with an extruded silicone profile inner compression seal. Glass shall be supported utilizing a spherical node and cylindrical tube, mechanical assembled spaceframe system.

1. Glass and Glazing System
 - a. All glass must be fully tempered, clear, laminated glass. Overall thickness of the glass is to be determined by the Structural Glass Contractor in accordance with specifications and drawings. Laminated glass is to be produced using a PVB interlayer bonded via an autoclave heat and pressure process. Minimum interlayer thickness is to be 0.060". (Poured or cast resin laminates will not be permitted.)
 - b. All glass must be horizontally tempered, eliminating tong marks. All edges will be ground flat with a frosted appearance unless otherwise noted. All edgework, holes and notches in the tempered glass panels will be completed before tempering and will comply with the requirements stated below:
 - i. ASTM C1036 Standard Specification for Flat Glass.
 - ii. ASTM C1048 Standard Specification for Heat-Treated Flat Glass.
 - iii. ASTM C1172 Standard Specification for Laminated Architectural Flat Glass.
 - iv. Safety glazing requirements as defined in ANSI Z97.1 and CPSC 16 CFR 1201.
 - c. The Subcontractor shall demonstrate that the stresses induced in the glass by the fittings are compatible with the strength of the glass and the needs of the performance section of this specification, especially at the holes. Provide finite element calculations to show compliance. Pre-stressing of the glass around holes, to a level which is compatible with the design and use of the fittings, is not permissible.
 - d. Glass Tolerances: Squareness of panels governs other tolerances and shall be within 3.0 mm of specified dimensions. Edge lengths shall be within 1.5 mm of specified dimensions. Holes shall be within 1.0 mm of specified locations. Bow shall be better than 0.1%.
 - e. Glass Holes: All drilled holes shall be countersunk or straight through. Fitting type shall be as shown in the architectural drawings. If glass is suspended, fitting shall not be countersunk. All edges of holes shall be cleaned and free of loose or ground materials. In insulated glass units, the holes shall be fully sealed and warranted to perform under applied loads and conditions by the glass manufacturer.
2. Roof Steel: Structural Steel Spaceframe System
 - a. System Description: The system shall be fabricated from steel and consists of cylindrical tubular members with conical ends connected to solid forged spherical nodes with special steel sleeves and steel bolts, without exception. Bottom chord shall consist of a W-section with flange in a horizontal orientation to facilitate window washing equipment.
 1. Steel Tubes:
 - a. Tube material shall conform to ASTM A500 Gr. B or equivalent minimum.
 - b. Assembly to consist of a hollow tube with a forged cone welded on each end. Cone materials shall be Grade 1018 to ASTM A576 or equivalent. Substitution of sealed tubes is not acceptable.
 2. Steel Nodes:
 - a. Nodes to consist of hot forged solid steel spheres conforming to AISI C 1045 material, normalized or equivalent. They shall be drilled and tapped as necessary. Extra holes other than those specifically shown in approved drawings are not permitted.
 - b. Joints using gusset plates, two piece assemblies, friction fit or castings shall not be used.
 3. Bolt Mechanism:
 - a. Bolts shall conform to DIN 267 Grades 5.6, 8.8, 10.9 or proven equivalent.
 - b. Pins shall be stainless steel.

- c. Tightening sleeves shall be galvanized mild steel of Grade 1018 to ASTM A576 or equivalent, or as required for ductility and strength.
- 4. Finishes:
 - a. Galvanizing: All spaceframe tubes shall be hot-dip galvanized on both exterior and interior surfaces to a minimum zinc film thickness of 55 microns as per ASTM A123.
 - b. All threaded or tapped parts shall be electro-galvanized according to ASTM B633.
 - c. Color coating: Tubes, connectors and accessories shall be finished with a thermoset polyester powder applied by electrostatic spray process minimum thickness 2.0 mils., maximum of 3.0 mils, oven dried and cured. Nodes to be coated with a wet applied polyurethane finish, 1.0 mils minimum in a color to match. Color to be selected from Novum standards.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Scope of this section includes the installation of structural glass, point support glass fixings, support steel and accessories. The Erector shall check all metal components upon delivery for dents, gouges or other imperfections which may result in rejection of the appearance or reduce strength.
- B. The Erector shall check the glass panels upon delivery for scratches, imperfections and edge damage. Damaged glass shall not be installed.

3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports as noted on the installation drawings. Handle, lift and align pieces using padded slings, suction cups and/or other protection required to maintain the appearance of the system throughout the installation process.
- B. Only lift at connections as approved by the system's Design Engineer.

3.3 INSTALLATION

- A. Erect structural glazing and accessory items in strict accordance with the approved shop/installation drawings and installation procedures.
 - 1. Glass shall not be positioned by the use of force. Provide temporary bracing and support as required to ensure stability during installation process.
 - 2. Bolt Head Orientation: All exposed bolt heads shall be oriented as indicated on the approved drawings. Where bolt head alignment is specified, the orientation shall be noted for each connection on the installation drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.
 - 3. Field Welding: If required at glazing arm supports, weld profile, quality and finish shall be consistent with the quality of any shop welds. If not visible, then welds shall comply with visual appearance specified in AWS D1.1. Weld size shall be per the approved shop drawings. Glass must be protected from heat and splatter.
 - 4. All bolts shall be fully tightened in accordance with methods indicated in the installation drawings. Specified pre-stressed bolts shall be tightened using the necessary tools and the torques checked. Reset calibrations often to ensure torque is accurate.

5. Clean glazing connectors receiving glazing materials of deleterious substances that might impair the work. Remove protective coatings that might fail in adhesion or interfere with bond of sealants. Comply with the manufacturer's instructions for final wiping of surfaces immediately before the application of primer and glazing sealants. Wipe metal surfaces with an appropriate cleaning agent.
 6. Sealants: Prime surfaces that are to receive glazing sealants in accordance with the manufacturer's recommendations, using recommended primers.
 7. Locate setting blocks, if required by the drawings, at the quarter points of the sill, but no closer than 6 inches to corners of the glass. Use blocks of proper sizes to support the glass in accordance with the manufacturer's recommendations.
 8. Ensure neoprene spacers separate the glass from attachment plates.
 9. Set the glass in a manner that produces the greatest possible degree of uniformity in appearance. Face all glass, which has a dissimilar face, with matching faces in the same direction. Carefully remove all stickers and clean affected area.
 10. Use masking tape or other suitable protection to limit the coverage of glazing materials on the surfaces intended for sealants.
 11. Tool the exposed surface of glazing materials.
 12. Clean excess sealant from the glass and support members immediately after the application, using solvents or cleaners recommended by the manufacturers.
- B. Structural glazing shall be installed clean and in one visit. General Contractor shall provide protection measures for completed structural glazing and accessories to prevent damage or deterioration from subsequent work.
- C. Obtain permission for any modification or field fabrication from the Engineer of the system. Glass cannot be modified.

3.4 FIELD QUALITY CONTROL AND CLEANING

- A. Structural Requirements: The Owner will engage an independent testing and inspecting agency to perform field inspections, testing and prepare test reports.
- B. Product Acceptance: The structural glazing and other items being supplied in the scope shall be installed clean by the Structural Glass Contractor and then protected by the General Contractor and any other following trades at their expense.

3.5 TOUCH-UP AND FINAL CLEANING

- A. Touch-up Painting: Cleaning and touch-up painting of any field welds and abraded areas of shop paint or stainless parts shall be completed to blend with the adjacent surfaces of the product. Such touch-up work shall be done in accordance with manufacturer's instructions.
- B. Final cleaning prior to hand over to the Owner shall be by the General Contractor.

3.6 WARRANTY

- A. Provide a five (5) year warranty on the design, engineering and installation workmanship. The start date of the warranty shall be the date of Substantial Completion.
- B. Provide the glass manufacturer's five (5) year warranty.

END OF SECTION

Appendix 1

Hazardous Materials Reports

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Addendum #1 Hazardous Materials Survey Report

**Rappahannock Community College
Glenns Campus
Glenns, Virginia**

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Appendix A – Asbestos Documentation, Laboratory Reports

Appendix B – LBP Testing Report, Laboratory Reports

1.0 Introduction

As authorized by Rappahannock Community College and nbj Architecture, Froehling & Robertson, Inc. (F&R) personnel performed additional testing at the Glenns Campus, Glenns, Virginia, on December 2, 2009. For more information regarding the findings of the original hazardous materials report, please reference F&R's report dated March 23, 2009.

The property consists of a one story brick building. The proposed scope of work for this project was a general, non-invasive survey for asbestos, LBP, PCB, and Mercury containing components in the building prior to the planned renovations of the building. It should be noted that some areas within the building were not accessible during this survey.

2.0 Asbestos-Containing Material (ACM)

2.1 Methodology

For this project, a visual, non-invasive survey and sampling for suspect asbestos containing materials was conducted at the above referenced site.

All samples were collected by Virginia Licensed Asbestos Inspectors and submitted to Environmental Hazards Services' NVLAP Accredited and Virginia Licensed Asbestos Laboratory, located in Richmond, Virginia. One (1) sample was analyzed using Polarized Light Microscopy (PLM) following EPA Method 600/R-93/116 following the December 2, 2009 site visit.

2.2 Results (Refer also to Appendix A for Laboratory Reports)

Table I: F&R's Testing Results – Glenns Campus

Sample #	Sample Location	Sample Type	Analytical Results
4	Roof	Roof Tar on Equipment	3% Chrysotile

NAD – No Asbestos detected

2.3 Conclusions and Recommendations

2.3.1 Asbestos-Containing Materials

Non-friable Asbestos-Containing Materials

Asbestos (3% Chrysotile) was detected in one (1) representative sample collected of the black roof tar on the roof top mechanical equipment. This material is classified as Category I non-friable ACM and is in fair condition. All roof equipment tar should be assumed to contain asbestos.

2.3.2 Presumed Asbestos-Containing Materials

Any suspect materials that have not been tested should be presumed to be Asbestos-Containing Materials.

Presumed ACMs: (See note at the bottom of this section)

The following materials are presumed to be asbestos containing materials:

- a) All materials that are not included in the renovation plan
- b) Exterior materials including roofing, window/door glaze, caulking, and soffit plaster
- c) Pipe Gaskets
- d) Fire Doors
- e) Heat Shields
- f) Damper Cloth
- g) Fan Coil Unit Insulation & Components
- h) Fire Proofing (above solid ceilings)
- i) TSI & Pipe Fittings (above solid ceilings, behind solid walls)
- j) Duct Wrap and Mastic

All TSI within the building should be assumed to contain asbestos. TSI may be located within pipe chases, above solid ceilings, and behind solid walls.

2.3 Applicable Regulations

EPA / NESHAP Regulations for Asbestos Containing Materials

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Non-friable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Non-friable ACM – Any material, excluding Category I Non-friable ACM, containing more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – One of the following:

1. Friable ACM
2. Category I Non-friable ACM that has become friable.

3. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4. Category II Non-friable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1. Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2. Remove all RACM from the facility before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3. RACM need not be removed if:
 - a) It is Category I non-friable ACM that is not in poor condition.
 - b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.
 - c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.
 - d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

3.0 Lead-Based Paint (LBP)

3.1 Methodology

The LBP testing was conducted by collecting paint chips for analysis by Environmental Hazards Services, LLC using EPA method SW846 7420. EHS is a NLLAP accredited laboratory for lead analysis.

Positive: Lead is present at or above the HUD standard of 0.50% by weight.

Negative: Lead is not present at or above the HUD standard of 0.50% by weight.

3.2 Findings

LBP Findings: (Refer also to the attachments for LBP Testing Report)

Sample Number	Sample Location	Paint Color	Analytical Result
1	Wall by Room 163	Orange	0.025%
2	Wall by Room 160	Cream	<0.0046%
3	Wall by Room 130D	Green	0.0048%
4	Wall by Room 125	Tan	0.094%

Sample Number	Sample Location	Paint Color	Analytical Result
5	Wall by Room 114	Blue	0.043%
6	Door Frame Room 166	Gray	0.036%

Lead based paint (as defined by US EPA) was not detected on painted surfaces on the interior of the building. Lead containing paint was detected on most painted surfaces tested.

3.3 OSHA Regulations for Lead-Based Paint

It is important to note that any painted surface may contain concentrations of lead in the paint, which when disturbed, may generate lead dust greater than the maximum exposure concentration of 30 micrograms per cubic millimeter established by the OSHA "Lead Exposure in Construction Rule" (29 CFR 1926.62). The OSHA standard gives no guidance on acceptable levels of lead in paint at which no exposure to airborne lead (above the action level) would be expected. Rather, OSHA defines airborne concentrations, and references specific types of work practices and operations from which a lead hazard may be generated (reference 29 CFR 1926.62, section d). Environmental and personnel monitoring should be conducted during any removal or demolition process (as appropriate) to determine actual personal exposure. This monitoring information can be used to determine the levels of personnel protection and environmental controls required for work involving specific removal/demolition processes on specific structures. Under OSHA requirements, the Contractor performing the work will be required to conduct this monitoring. It is important to note that environmental controls will vary dependent upon the content of lead in paint, the process used to remove it, duration of the work, and the amount of paint to be removed. Based on the anticipated scope of work for this project (demolition of the structure) the presence of LBP is not anticipated on having a major impact with regards to cost for remediation/demolition of the structure.

F&R also recommends collection and analysis of materials that would represent the building waste stream for TCLP analysis.

4.0 PCB-Containing Light Ballasts & Other Materials

4.1 Methodology

Light ballasts are the electrical components attached to fluorescent light fixtures usually found under a metal over-plate. Prior to 1978, ballasts were commonly manufactured with polychlorinated biphenyls (PCBs). PCBs were used in fluorescent light ballasts because of their good electrical insulating capabilities. Ballasts made after 1978 are usually marked "Non-PCB."

PCBs may also be found in caulking. This is a relatively new development recently reported by EPA. The only way to determine the presence of PCBs in caulk is by testing the caulk. Each type of caulk would need to be tested individually. At this time, F&R has assumed all caulking as potentially PCB containing.

4.2 Results

F&R observed approximately 715 suspect PCB containing light ballasts on various fixtures located throughout the renovation areas. Various types of caulking are also present.

4.3 Findings and Recommendations

The disposal of fluorescent light ballasts should be based upon the presence or lack thereof of PCBs and the condition of the ballasts (leaking, etc.). The best option for non-leaking PCB ballasts is to recycle them at an approved recycling facility. Non-leaking PCB ballasts that aren't recycled must be managed and disposed of as hazardous waste. Leaking PCB ballasts should be handled with extreme caution to avoid exposure, contamination and liability. All applicable local, state and federal regulations should be followed for removal and disposal of these materials.

If caulking is present, it is recommended that specific areas/caulkings be identified and sampled prior to disturbance since it would be cost prohibitive to sample all suspect caulking. As an interim measure the Owner should refer to EPA 9/25/09 Guidance document on PCBs in caulking for long term management of these materials. F&R can assist in this process if requested.

5.0 Mercury-Containing Components

5.1 Methodology

Mercury is used in several building components including fluorescent lamps, mercury vapor lamps, and wall thermostats. In fluorescent lighting, mercury-containing dust forms from the mercury vapor found within the lamps.

5.2 Results

During this survey, F&R personnel observed approximately 1,529 suspect mercury containing fluorescent tubes and 34 mercury switches on various fixtures located throughout the renovation areas.

5.3 Findings and Recommendations

The mercury containing fluorescent tubes and switches should be removed and disposed of/recycled according to regulatory guidelines by an appropriately licensed/certified contractor. Mercury containing waste components are considered hazardous waste materials in the State of Virginia. All applicable local, state and federal regulations should be followed for removal and disposal of these materials.

6.0 Limitations

This report has been prepared for the exclusive use of the nbj Architecture. This service was performed in accordance with generally accepted environmental practices. No other warranty,

expressed or implied, is made. Our conclusions and recommendations are based, in part, upon information provided to us by others and our site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Our observations and recommendations are based upon conditions readily visible at the site at the time of our site visit, and upon current industry standards. During F&R's inspection, accessible areas were visually surveyed for the presences of suspected ACM and LBP. Inaccessible areas, such as behind ceilings or walls may not have been surveyed and therefore suspected ACM and LBP may not have been identified. Areas inspected for suspect ACM and LBP were limited to those designated by the scope of services.

During this study, suspect hazardous material samples were submitted for laboratory analysis. As with any similar survey of this nature, actual conditions exist only at the precise locations from which suspect samples were collected. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. No other warranty, expressed or implied, is made.

Under this scope of services, F&R assumes no responsibility regarding response actions (e.g. O&M Plans, Encapsulation, Abatement, Removal, Notifications, etc.) initiated as a result of these findings. F&R assumes no liability for the duties and responsibilities of the Client with respect to compliance with these regulations. Compliance with regulations and response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements and should be performed by appropriately qualified and licensed-personnel, as warranted.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies any conditions at the site that may present a potential danger to public health, safety, or the environment. The Client agrees to notify the appropriate local, state, or federal public agencies as required by law, or otherwise to disclose, in a timely manner, any information that may be necessary to prevent any danger to public health, safety, or the environment. The contents of the report should not be construed in any way as a recommendation to purchase, sell, or develop the project site.

APPENDIX A

ASBESTOS DOCUMENTATION, LABORATORY REPORTS

APPENDIX B

LBP TESTING REPORT, LABORATORY REPORTS



Asbestos Bulk Analysis Report

Environmental Hazards Services, L.L.C.

7469 Whitepine Rd

Richmond, VA 23237

Telephone: 800.347.4010

Report Number: 09-12-00451

Client: Froehling & Robertson - Richmond

P.O. Box 27524

Attn: Dept 54

Richmond, VA 23261

Received Date: 12/03/2009

Analyzed Date: 12/03/2009

Reported Date: 12/04/2009

Project/Test Address: K60 5369; RCC; Warsaw & Glenns, VA

Client Number:

48-2016

Laboratory Results

Fax Number:

804-266-1275 E
MS

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
09-12-00451-001	1		White Rubber-Like	7% Chrysotile	93% Non-Fibrous
Total Asbestos: 7%					
09-12-00451-002	2		Black Tar-Like	12% Chrysotile	88% Non-Fibrous
Total Asbestos: 12%					
09-12-00451-003	3		Black Tar-Like	NAD	100% Non-Fibrous
09-12-00451-004	4		Black Tar-Like	3% Chrysotile	97% Non-Fibrous
Total Asbestos: 3%					

Environmental Hazards Services, L.L.C

Client Number: 48-2016

Report Number: 09-12-00451

Project/Test Address: K60 5369; RCC; Warsaw & Glenns, VA

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
-------------------	----------------------	------------	-----------------------	----------	-----------------

QC Sample: 58-M22004-4

QC Blank: SRM 1866 Fiberglass

Reporting Limit: 1% Asbestos

Method: EPA Method 600/R-93/116

Analyst: Laura Holder

Reviewed By Authorized Signatory:



Howard Varner
General Manager

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection.

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), (for enhanced detection capabilities) for materials regulated by EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

* All California samples analyzed by Polarized Light Microscopy, EPA Method 600/M4-82-020, Dec. 1982.

LEGEND: NAD = no asbestos detected



EHS
Laboratories™

Environmental Hazards Services, LLC

www.ehsllab.com
(800)347-4010
(804)276-4807 (fax)

7469 Whitepine Rd
Richmond, VA 23237

Asbestos Chain-of-Custody



09-12-00451

Due Date:

12/04/2009

(Friday)

h MR

Company Name:

E&L Richmond 3015 Dumbarton Rd Richmond VA 23226

Phone: (

804) 2701

Fax: (

804) 1275

E-mail:

JBartlett@ehsllab.com

Acct. Number:

Project Name/Testing Address:

1600 S 31st St REC

City/State (Required):

Worndon ? Glenview VA

Collected by:

JBartlett

Purchase Order Number:

Turn Around Times:

If no TAT is specified, sample(s) will be processed and charged as 3-day TAT.

☒ 1-Day ☐ 2-Day ☐ 3-Day

☐ Same Day (Must Call Ahead)

☐ Weekend (Must Call Ahead)

No.	Client Sample ID	Date Collected	ASBESTOS						AIR				COMMENTS	
			PLM	PLM Point Count 400	PLM Point Count 1000	PLM NY Protocol	PCM	TEM Chatfield (Bulk)	TEM AHERA (Air)	Time On	Time Off	Flow Rate (L / min)		Total Time (minutes)
1	1	12-2-09	X											Flash Tank W
2	2													Flash W
3	3													Penetration Tar
4	4													Roof Tar Equip G
5														
6														
7														
8														
9														
10														
Released by: <i>[Signature]</i>			Signature: _____						Date/Time: _____					
Received by: <i>[Signature]</i>			Signature: _____						Date/Time: 12/3/09					

Released by:

JBartlett

Signature:

Received by:

JBartlett

Signature:

Date/Time:

12/3/09

Date/Time:

12/3/09



Lead Paint Chip Analysis Report

Environmental Hazards Services, L.L.C.
7469 Whitepine Rd
Richmond, VA 23237
Telephone: 800.347.4010

Client: Froehling & Robertson - Richmond
P.O. Box 27524
Attn: Dept 54
Richmond, VA 23261

Report Number: 09-12-00452

Received Date: 12/03/2009

Analyzed Date: 12/04/2009

Reported Date: 12/04/2009

Project/Test Address: K60 5369 RCC; Glenss, VA

Client Number:
48-2016

Laboratory Results

Fax Number:
804-266-1275 E
MS

Lab Sample Number	Client Sample Number	Collection Location	Pb (ug/g) ppm	% Pb by Wt.	Narrative ID
09-12-00452-001	1	R163	250	0.025	
09-12-00452-002	2	R160	<46	<0.0046	
09-12-00452-003	3	R130D	48	0.0048	
09-12-00452-004	4	R125	940	0.094	
09-12-00452-005	5	R114	430	0.043	
09-12-00452-006	6	R166	360	0.036	

Environmental Hazards Services, L.L.C

Client Number: 48-2016

Report Number: 09-12-00452

Project/Test Address: K60 5369 RCC; Glenss, VA

Lab Sample Number	Client Sample Number	Collection Location	Pb (ug/g) ppm	% Pb by Wt.	Narrative ID
----------------------	-------------------------	---------------------	------------------	----------------	-----------------

Method: EPA SW846 7420

Reviewed By Authorized Signatory:



Deborah Britt
QA/QC Clerk

The HUD lead guidelines for lead paint chipers are 0.50% by Weight, 5000 ppm, or 1.0 mg/cm². Sample Results denoted with a "less than" (<) sign contains less than 10ug total lead, based on a 100mL volume. Paint chip area and results are calculated based on area measurements determined by the client.

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. If the report does not contain the result for a field blank, it is due to the fact that the client did not include a field balnk with their samples. EHS sample reulsts do not reflect blank correction. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714.

LEGEND	Pb= lead	ug = microgram	ppm = parts per million
	ug/g = micrograms per gram	Wt. = weight	



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Environmental Hazards Services, LLC

www.ehsllab.com
(800) 347-4010
(804) 275-4907 (fax)

7409 Whitepine Rd
Richmond, VA 23237

Lead Chain-of-Custody

Due Date:

12/04/2009
(Friday)

09-12-00452



h
M

Company Name:

FA R Richmond

Address:

3015 Dumbarton Rd

City/State/Zip:

Richmond VA 23228

Phone:

(804) 264 2701

Fax:

(804) 264 1275

E-mail:

Bartlett@fandr.com

Account Number:

1005362 RAC

Project Name / Testing Address:

1005362 RAC

City/State (Required):

Richmond VA

Collected by:

Bartlett

Certification Number:

Yes ☐ No ☐

Purchase Order Number:

* Do wipe samples submitted meet ASTM E1792 requirements?

Yes ☐ No ☐

Turn Around Time (TAT)
☒ 1-Day ☐ 3-Day
☐ Same Day (Must Call Ahead)
☐ We extend (Must Call Ahead)
If no TAT is specified, sample(s) will be processed and charged as 3-Day TAT.

Sample Type
Single Dust Wipe = DW Soil = S
Paint Chip = PC Air = A
Composite Soil = CS

Abbreviations
FR = Family Room F = Front 0 = Basement
LR = Living Room R = Rear KT = Kitchen
DN = Den LT = Left BA = Bath
DR = Dining Room RT = Right BR = Bedroom
1 = 1st Fl 2 = 2nd Fl

Surface Type for Dust Wipe
FL = Floor
CP = Carpet
SL = Window Sill
WW = Window Well

No.	Sample Type	Date Collected	Client Sample ID	Collection Location (LR, KT, LTRBR, RTBR, etc.)	Surface Type	Area		Paint Chip		Air		Comments
						Length X Width in inches (Provide paint chip area only if requesting mg/cm2)	g	g	g	Flow Rate (L/min)	Total Time (minutes)	
1	PC	12-2-09	1		Wall	X		X				Orange Paint
2			2			X						Green Rm 1305
3			3			X						Tan Rm 125
4			4			X						Blue Rm 114
5			5			X						Gray Rm 114
6			6		Door Frame	X						
7			7			X						
8			8			X						
9			9			X						
10			10			X						

Released by: [Signature] Signature: [Signature] Date/Time: 12/3/09

Received by: [Signature] Signature: [Signature] Date/Time: 12/3/09



FROEHLING & ROBERTSON, INC.

Engineering • Environmental • Geotechnical

3015 Dumbarton Road
Richmond, Virginia 23228-5831 | USA
T 804.264.2701 | F 804.264.1275

Addendum #1 – Hazardous Materials Survey Report

Rappahannock Community College

Warsaw Campus

Warsaw, Virginia

Prepared For:

Mr. Floyd Cybulski
nbj Architecture
11537-B Nuckols Road
Glen Allen, Virginia 23059

Prepared By:

Froehling & Robertson, Inc.
3015 Dumbarton Road
Richmond, Virginia 23228

F&R Project Number K60-5369E
January 8, 2010

Prepared by:

Jennifer D. Bartlett
Industrial Hygienist
Environmental Services

Reviewed by:

Christopher J. Chapman, CIH
Senior Industrial Hygienist
Environmental Services

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Appendix A – Asbestos Documentation, Laboratory Reports

Appendix B – LBP Testing Report, Laboratory Reports

1.0 Introduction

As authorized by Rappahannock Community College and nbj Architecture, Froehling & Robertson, Inc. (F&R) personnel performed additional testing at the Warsaw Campus, Warsaw, Virginia, on December 2, 2009. For more information regarding the findings of the original hazardous materials survey report, please reference F&R's report dated March 23, 2009.

The property consists of a one story brick building. The proposed scope of work for this project was a general, non-invasive survey for asbestos, PCB, and Mercury containing components in the building prior to the planned renovations of the building. It should be noted that some areas within the building were not accessible during this survey.

2.0 Asbestos-Containing Material (ACM)

2.1 Methodology

For this project, a visual, non-invasive survey and sampling for suspect asbestos containing materials was conducted at the above referenced site.

All samples were collected by Virginia Licensed Asbestos Inspectors and submitted to Environmental Hazards Services' NVLAP Accredited and Virginia Licensed Asbestos Laboratory, located in Richmond, Virginia. One (1) sample was analyzed using Polarized Light Microscopy (PLM) following EPA Method 600/R-93/116 following the December 2, 2009 site visit.

2.2 Results (Refer also to Appendix A for Laboratory Reports)

Table I: F&R's Testing Results – Warsaw Campus

Sample #	Sample Location	Sample Type	Analytical Results
1	Roof	Caulk on Flashing	7% Chrysotile
2	Roof	Flashing	12% Chrysotile
3	Roof	Penetration Tar	NAD

NAD – No Asbestos detected

2.3 Conclusions and Recommendations

2.3.1 Asbestos-Containing Materials

Non-friable Asbestos-Containing Materials

Asbestos (7% Chrysotile) was detected in one (1) representative sample collected of the caulk on the metal roof flashing. This material is classified as Category I non-friable ACM and is in fair condition. All roof flashing caulk should be assumed to contain asbestos.

Asbestos (12% Chrysotile) was detected in one (1) representative sample collected of the roof flashing material. This material is classified as Category I non-friable ACM and is in fair condition. All roof flashing material should be assumed to contain asbestos.

Note: Silver paint was observed on the metal roof flashing. This material is known to be asbestos containing material.

2.3.2 Presumed Asbestos-Containing Materials

Any suspect materials that have not been tested should be presumed to be Asbestos-Containing Materials.

Presumed ACMs: (See note at the bottom of this section)

The following materials are presumed to be asbestos containing materials:

- a) All materials that were not sampled as part of this survey
- b) Exterior materials including roofing, window/door glaze, caulking, and soffit plaster
- c) Pipe Gaskets
- d) Fire Doors
- e) Heat Shields
- f) Damper Cloth
- g) Fan Coil Unit Insulation & Components
- h) Fire Proofing (above solid ceilings)
- i) TSI & Pipe Fittings (above solid ceilings, behind solid walls)
- j) Duct Wrap and Mastic

All TSI within the building should be assumed to contain asbestos. TSI may be located within pipe chases, above solid ceilings, and behind solid walls.

2.3 Applicable Regulations

EPA / NESHAP Regulations for Asbestos Containing Materials

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Non-friable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Non-friable ACM – Any material, excluding Category I Non-friable ACM, containing more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – One of the following:

1. Friable ACM
2. Category I Non-friable ACM that has become friable.
3. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4. Category II Non-friable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1. Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2. Remove all RACM from the facility before any activity begins that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3. RACM need not be removed if:
 - a) It is Category I non-friable ACM that is not in poor condition.
 - b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.
 - c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.
 - d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

3.0 PCB-Containing Light Ballasts

3.1 Methodology

Light ballasts are the electrical components attached to fluorescent light fixtures usually found under a metal over-plate. Prior to 1978, ballasts were commonly manufactured with polychlorinated biphenyls (PCBs). PCBs were used in fluorescent light ballasts because of their good electrical insulating capabilities. Ballasts made after 1978 are usually marked "Non-PCB."

PCBs may also be found in caulking. This is a relatively new development recently reported by EPA. The only way to determine the presence of PCBs in caulk is by testing the caulk. Each type of caulk would need to be tested individually. At this time, F&R has assumed all caulking as potentially PCB containing.

3.2 Results

F&R observed approximately 735 suspect PCB containing light ballasts on various fixtures located throughout the renovation areas. Various types of caulking are also present.

3.3 Findings and Recommendations

The disposal of fluorescent light ballasts should be based upon the presence or lack thereof of PCBs and the condition of the ballasts (leaking, etc.). The best option for non-leaking PCB ballasts is to recycle them at an approved recycling facility. Non-leaking PCB ballasts that aren't recycled must be managed and disposed of as hazardous waste. Leaking PCB ballasts should be handled with extreme caution to avoid exposure, contamination and liability. All applicable local, state and federal regulations should be followed for removal and disposal of these materials.

If caulking is present, it is recommended that specific areas/caulkings be identified and sampled prior to disturbance since it would be cost prohibitive to sample all suspect caulking. As an interim measure the Owner should refer to EPA 9/25/09 Guidance document on PCBs in caulking for long term management of these materials. F&R can assist in this process if requested.

4.0 Mercury-Containing Components

4.1 Methodology

Mercury is used in several building components including fluorescent lamps, mercury vapor lamps, and wall thermostats. In fluorescent lighting, mercury-containing dust forms from the mercury vapor found within the lamps.

4.2 Results

During this survey, F&R personnel observed approximately 1,450 suspect mercury containing fluorescent tubes and 43 mercury switches on various fixtures located throughout the renovation areas.

4.3 Findings and Recommendations

The mercury containing fluorescent tubes and switches should be removed and disposed of/recycled according to regulatory guidelines by an appropriately licensed/certified contractor. Mercury containing waste components are considered hazardous waste materials in the State of Virginia. All applicable local, state and federal regulations should be followed for removal and disposal of these materials.

5.0 Limitations

This report has been prepared for the exclusive use of the nbj Architecture. This service was performed in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made. Our conclusions and recommendations are based, in part, upon information provided to us by others and our site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Our observations and recommendations are based upon conditions readily visible at the site at the time of our site visit, and upon current industry standards. During F&R's inspection, accessible areas were visually surveyed for the presences of suspected ACM and LBP. Inaccessible areas, such as behind ceilings or walls may not have been surveyed and therefore suspected ACM and LBP may not have been identified. Areas inspected for suspect ACM and LBP were limited to those designated by the scope of services.

During this study, suspect hazardous material samples were submitted for laboratory analysis. As with any similar survey of this nature, actual conditions exist only at the precise locations from which suspect samples were collected. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. No other warranty, expressed or implied, is made.

Under this scope of services, F&R assumes no responsibility regarding response actions (e.g. O&M Plans, Encapsulation, Abatement, Removal, Notifications, etc.) initiated as a result of these findings. F&R assumes no liability for the duties and responsibilities of the Client with respect to compliance with these regulations. Compliance with regulations and response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements and should be performed by appropriately qualified and licensed-personnel, as warranted.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state, or federal public agencies any conditions at the site that may present a potential danger to public health, safety, or the environment. The Client agrees to notify the appropriate local, state, or federal public agencies as required by law, or otherwise to disclose, in a timely manner, any information that may be necessary to prevent any danger to public health, safety, or the environment. The contents of the report should not be construed in any way as a recommendation to purchase, sell, or develop the project site.

APPENDIX A

ASBESTOS DOCUMENTATION, LABORATORY REPORTS



Environmental Hazards Services, L.L.C.

7469 Whitepine Rd

Richmond, VA 23237

Telephone: 800.347.4010

Asbestos Bulk Analysis Report

Report Number: 09-12-00451

Client: Froehling & Robertson - Richmond
P.O. Box 27524
Attn: Dept 54
Richmond, VA 23261

Received Date: 12/03/2009
Analyzed Date: 12/03/2009
Reported Date: 12/04/2009

Project/Test Address: K60 5369; RCC; Warsaw & Glenss, VA

Client Number:
48-2016

Fax Number:
804-266-1275 E
MS

Laboratory Results

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
09-12-00451-001	1		White Rubber-Like	7% Chrysotile	93% Non-Fibrous
Total Asbestos: 7%					
09-12-00451-002	2		Black Tar-Like	12% Chrysotile	88% Non-Fibrous
Total Asbestos: 12%					
09-12-00451-003	3		Black Tar-Like	NAD	100% Non-Fibrous
09-12-00451-004	4		Black Tar-Like	3% Chrysotile	97% Non-Fibrous
Total Asbestos: 3%					

Environmental Hazards Services, L.L.C

Client Number: 48-2016

Report Number: 09-12-00451

Project/Test Address: K60 5369; RCC; Warsaw & Glenns, VA

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
-------------------	----------------------	------------	-----------------------	----------	-----------------

QC Sample: 58-M22004-4

QC Blank: SRM 1866 Fiberglass

Reporting Limit: 1% Asbestos

Method: EPA Method 600/R-93/116

Analyst: Laura Holder

Reviewed By Authorized Signatory:



Howard Vamer
General Manager

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection.

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), (for enhanced detection capabilities) for materials regulated by EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

* All California samples analyzed by Polarized Light Microscopy, EPA Method 600/M4-82-020, Dec. 1982.

LEGEND: NAD = no asbestos detected



Laboratories™

Environmental Hazards Services, LLC

www.leadlab.com
(800)347-4010
(804)276-4907 (fax)

7469 Whitepine Rd
Richmond, VA 23237

Asbestos Chain-of-Custody

09-12-00451



Due Date:
12/04/2009
(Friday)

h MR

Company Name: E&L Richmond Address: 3015 Dumbarton Rd City/State/Zip: Richmond VA 23226
Phone: () 804 2701 Fax: () 804 1275 E-mail: JBartlett@leadlab.com Accr. Number: _____
Project Name/Testing Address: 1600 S 31st St REC City/State (Required): Winson ? Glenens VA
Collected by: JBartlett Purchase Order Number: _____

Turn Around Times : If no TAT is specified, sample(s) will be processed and charged as 3-day TAT.

☒ 1 - Day ☐ 2 - Day ☐ 3 - Day ☐ Same Day (Must Call Ahead) ☐ Weekend (Must Call Ahead)

No.	Client Sample ID	Date Collected	ASBESTOS						AIR				COMMENTS	
			PLM	PLM Point Count 400	PLM Point Count 1000	PLM NY Protocol	PCM	TEM Chatfield (Bulk)	TEM AHERA (Air)	Time On	Time Off	Flow Rate (L/min)		Total Time (minutes)
1	1	12-2-09	X											Flash Cont. W
2	2													Flash W
3	3													Penetration Tar
4	4													Roof Tar Equip G
5														
6														
7														
8														
9														
10														
Released by: <i>[Signature]</i>			Signature: _____						Date/Time: _____					
Received by: <i>[Signature]</i>			Signature: _____						Date/Time: 12/3/09					

Released by: JBartlett Signature: _____ Date/Time: 12/3/09
Received by: JBartlett Signature: _____ Date/Time: _____

